

EXHIBIT 11



US Law Week
Oct. 3, 2022, 9:33 AM

Bump-Stock Ban Left Intact as Supreme Court Rejects Challenges

By Greg Stohr

The US Supreme Court left intact the federal ban on bump stocks, the attachments that can make a semiautomatic rifle fire like a machine gun, turning away arguments from advocates including the National Rifle Association.

The justices without comment rejected two challenges to a criminal ban the Trump administration put in place after the October 2017 Las Vegas concert massacre, when about a dozen bump stocks were found in the shooter's hotel room. Sixty people were killed in that attack, the deadliest mass shooting in modern American history.

The order comes three months after the justices ruled in a New York case that most people have a constitutional right to carry a handgun in public. It follows a series of mass shootings this year, including the rampage that left 19 children and two teachers dead at an Uvalde, Texas, elementary school.

The bump-stock rejections end months of behind-the-scenes maneuvering. The justices were originally scheduled to discuss one of the appeals, pressed by Utah gun lobbyist W. Clark Aposhian, at a private conference in December. They rescheduled the case 20 times, and eventually decided to carry it over to the new term.

The Supreme Court also rejected a separate challenge pressed by people and groups led by Gun Owners of America.

The challengers argued that Congress didn't give the Bureau of Alcohol, Tobacco, Firearms and Explosives authority to classify bump stocks as machine guns, which have been virtually banned in the US since 1986.

They also faulted a federal appeals court for invoking "Chevron deference," a legal doctrine requiring judges in many cases to defer to regulatory agencies on the meaning of ambiguous laws. The opponents said Chevron deference shouldn't apply to the interpretation of criminal statutes.

"Imposing criminal liability comes with certain stigmas and a loss of liberty," the NRA argued in a friend-of-the-court brief in the Aposhian case. "Those moral judgments are the types of important questions that Congress must answer itself."

ATF estimated when it proposed the rule that US residents possessed 520,000 bump stocks, which the ban required to be relinquished or destroyed. The Supreme Court let the ban take effect in 2019.

The Biden administration urged the Supreme Court to reject the appeals without a hearing. The administration said ATF didn't rely on Chevron deference, making the case a poor choice for determining the reach of that legal doctrine.

"ATF's interpretation reflects the best understanding of the statutory language," Solicitor General Elizabeth Prelogar argued.

The National Firearms Act defines a machine gun as "any weapon which shoots, is designed to shoot, or

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The cases are *Aposhian v. Garland*, 21-159, and *Gun Owners of America v. Garland*, 21-1215.

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EXHIBIT 12

“ASSAULT WEAPON” LETHALITY

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INTRODUCTION

“Assault weapon” bans are a popular form of gun-control legislation. Such bans have been enacted in direct response to mass shootings¹ or as part of comprehensive legislation aimed at reducing

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1. See, e.g., Thomas Kaplan & Danny Hakim, *Intent on Being First, Cuomo Used All Means to Enact Gun Limits*, N.Y. TIMES (Jan. 23, 2013), <https://www.nytimes.com/2013/01/24/nyregion/cuomo-used-all-his-means-to-pass-gun-control-package.html>.

gun violence.² While handguns are the overwhelming weapon of choice for mass shooters³ and rifles of every kind are used in only 2%–3% of murders nationwide,⁴ gun-control advocates nevertheless single out “assault weapons” as uniquely deserving of prohibition. The reason, they say, is that “assault weapons” are far more dangerous than other modern firearms and ill-suited for lawful activities like self-defense. They use descriptors like “weapons of war,” “uniquely lethal,” and “high-powered” to suggest that these firearms cause much more harm than they prevent and therefore ordinary citizens should not have them.

“Assault weapons” long have been portrayed as exceptionally powerful firearms designed for killing large numbers of people. When enacting the nation’s very first “assault weapon” ban in 1989, the California legislature found that “each firearm has such a high rate of fire and capacity for firepower that its function as a legitimate sports or recreational firearm is substantially outweighed by the danger that it can be used to kill and injure human beings.”⁵ One primary consideration that prompted the federal “assault weapon” ban 1994–2004 was the “perceived dangerousness” of these firearms, which purportedly allow shooters “to fire high numbers of shots rapidly, thereby potentially increasing both the number of person[s] wounded per gunfire incident (including both intended targets and innocent bystanders) and the number of gunshot victims suffering multiple wounds.”⁶

2. See, e.g., Trip Gabriel, *New Gun Restrictions Pass the Legislature in Maryland*, N.Y. TIMES (Apr. 4, 2013), <https://www.nytimes.com/2013/04/05/us/tighter-gun-rules-pass-the-maryland-legislature.html>.

3. Elzerie de Jager et al., *Lethality of Civilian Active Shooter Incidents with and Without Semiautomatic Rifles in the United States*, 320 JAMA 1034, 1034 (2018) (stating that 187 of 248 active shooter incidents in the United States involved handguns). Between 2000 and 2017, “assault weapons” were used in only about 25% of active shooter events. Polly Mosendz, *Assault Rifles Aren’t the Weapon of Choice for ‘Active Shooters’*, BLOOMBERG (Sept. 11, 2018, 11:00 AM), <https://www.bloomberg.com/news/articles/2018-09-11/semi-autos-aren-t-the-weapon-of-choice-for-active-shooters>.

4. See *Expanded Homicide Data Table 8*, FED. BUREAU OF INVESTIGATION: UNIF. CRIME REPORTING (2018), <https://ucr.fbi.gov/crime-in-the-u.s/2018/crime-in-the-u.s.-2018/tables/expanded-homicide-data-table-8.xls>.

5. *People v. James*, 94 Cal. Rptr. 3d 576, 580 (Ct. App. 2009) (quoting CAL. PENAL CODE § 12275.5 (repealed 2012)).

6. CHRISTOPHER S. KOPER ET AL., AN UPDATED ASSESSMENT OF THE FEDERAL ASSAULT WEAPONS BAN: IMPACTS ON GUN MARKETS AND GUN VIOLENCE, 1994–2003, at 80 (2004).

Present-day ban advocates continue this narrative. The Giffords Law Center to Prevent Gun Violence says “assault weapons” are “highly lethal” and “specifically designed to kill humans quickly and efficiently.”⁷ Everytown for Gun Safety calls such firearms “high-powered” and “exceptionally deadly.”⁸ According to the Brady Campaign to Prevent Gun Violence, “assault weapons” are “designed for military use and quick, efficient killing” and are “uniquely lethal because of their rapid rate of fire and high muzzle velocity.”⁹ Prior to House Judiciary Committee hearings in September 2019 on pending federal legislation to ban “assault weapons,” Senator Diane Feinstein (D-CA) called these weapons the “deadliest” of firearms.¹⁰

While there is no generally agreed-upon definition of “assault weapon,”¹¹ the main target of “assault weapon” bans is the semiautomatic AR-15 rifle. The AR-15 is the most popular rifle in America today, owned by millions for self-defense and other lawful purposes.¹² While the AR-15 looks like a fully automatic military M16

7. *Assault Weapons*, GIFFORDS L. CTR. TO PREVENT GUN VIOLENCE, <https://lawcenter.giffords.org/gun-laws/policy-areas/hardware-ammunition/assault-weapons/> (last visited Oct. 7, 2020).

8. *Assault Weapons and High-Capacity Magazines*, EVERYTOWN FOR GUN SAFETY SUPPORT FUND (Mar. 22, 2019), https://everytownresearch.org/assault-weapons-high-capacity-magazines/#foot_note_anchor_2.

9. *What are Assault Weapons and High-Capacity Magazines?*, BRADY UNITED, <https://www.bradyunited.org/fact-sheets/what-are-assault-weapons-and-high-capacity-magazine> (last visited Oct. 7, 2020).

10. Press Release, Dianne Feinstein, Sen., U.S. Senate, Mass Shootings Involving Assault Weapons Kill More People than Other Weapons (Sept. 20, 2019), <https://www.feinstein.senate.gov/public/index.cfm/press-releases?id=576E306C-5FD4-4144-A28A-2C034628D888>.

11. See, e.g., David B. Kopel, *Defining “Assault Weapons,”* REGUL. REV. (Nov. 14, 2018), <https://www.theregreview.org/2018/11/14/kopel-defining-assault-weapons/>. The scope of this Article is limited to semiautomatic rifles and does not include semiautomatic pistols and shotguns included in many “assault weapon” bans.

12. See Jon Schuppe, *America’s Rifle: Why So Many People Love the AR-15*, NBC NEWS (Feb. 15, 2018, 8:08 AM), https://www.nbcnews.com/news/us-news/america-s-rifle-why-so-many-people-love-ar-15-n831171?cid=public-rss_20171228 (“[T]he AR-15 remains a jewel of the gun industry, the country’s most popular rifle, irreversibly lodged into American culture.”); see also *NSSF Releases Firearms Production Figures*, NAT’L SHOOTING SPORTS FOUND. (Dec. 4, 2019), <https://www.nssf.org/nssf-releases-firearms-production-figures/> (reporting that “[a]pproximately half of all rifles produced in 2017 were modern sporting rifles” like the AR-15 and that approximately 17.7 million such rifles were produced in the United States or imported 1990–2017); Alex Yablon, *How Many Assault Weapons Do Americans Own?*, TRACE (Sept. 22, 2018), <https://www.thetrace.org/2018/09/how-many-assault-weapons-in-the-us/> (noting that there are “between fifteen and twenty million modern sporting rifles like the AR-15 now in circulation”). This Article uses “AR-15” as a shorthand term for all AR-15 variants.

rifle or M4 carbine, it is not a machine gun, nor does it fire as rapidly as a machine gun. It has a semiautomatic-only firing mechanism like most modern handguns and fires a smaller projectile than most modern hunting rifles. Legislatures enacting “assault weapon” bans nevertheless have concluded that the AR-15 is exceptionally deadly, and federal courts have agreed.

Five federal circuit courts have relied on the lethality rationale in upholding “assault weapon” bans against Second Amendment challenges.¹³ Three circuits have declared that “assault weapons” have “a capability for lethality—more wounds, more serious, in more victims—far beyond that of other firearms in general, including other semiautomatic guns.”¹⁴ In *District of Columbia v. Heller* (*Heller II*), the D.C. Circuit endorsed claims that “assault weapons” like the AR-15 are designed “to shoot multiple human targets very rapidly”¹⁵ and “fire almost as rapidly as automatics.”¹⁶ The Second Circuit in *New York State Rifle & Pistol Ass’n v. Cuomo* (*NYSRPA*) concluded that the banned firearms “pose unusual risks” and are “particularly hazardous.”¹⁷ In *Kolbe v. Hogan*, the Fourth Circuit described firearms like the AR-15 as “exceptionally lethal weapons of war” and found “scant evidence . . . that the banned assault weapons . . . are possessed or even suitable[] for self-protection.”¹⁸ *Kolbe* went so far as to hold that “assault weapons” are not protected arms under the Second Amendment because of their deadly similarity to machine guns.¹⁹ Most recently, the First Circuit in *Worman v. Healey* declared that “[s]emiautomatic assault weapons permit a shooter to fire multiple rounds very quickly, allowing him to hit more victims in a

13. *Worman v. Healey*, 922 F.3d 26, 41 (1st Cir. 2019); *Kolbe v. Hogan*, 849 F.3d 114, 140–41 (4th Cir. 2017) (en banc); *N.Y. State Rifle & Pistol Ass’n v. Cuomo* (*NYSRPA*), 804 F.3d 242, 269 (2d Cir. 2015); *Friedman v. City of Highland Park*, 784 F.3d 406, 412 (7th Cir. 2015); *Heller v. District of Columbia* (*Heller II*), 670 F.3d 1244, 1247–48, 1264 (D.C. Cir. 2011).

14. *Worman*, 922 F.3d at 31 (internal quotation marks omitted) (quoting H.R. REP. NO. 103-489, at 19–20 (1994)); *Kolbe*, 849 F.3d at 125, 137, 144 (same); *NYSRPA*, 804 F.3d at 262 (same).

15. 670 F.3d at 1262 (internal quotation marks omitted) (citation omitted).

16. *Id.* at 1263 (citation omitted); see also *Friedman*, 784 F.3d at 411 (“[A]ssault weapons with large-capacity magazines can fire more shots, faster, and thus can be more dangerous in [the] aggregate. Why else are they the weapons of choice in mass shootings?”).

17. 804 F.3d at 262.

18. 849 F.3d at 124, 141, 145 (footnote omitted).

19. See *id.* at 124–28, 135–37.

shorter period of time.”²⁰ It further asserted that using “assault weapons” for home defense “is tantamount to using a sledgehammer to crack open the shell of a peanut.”²¹

For these courts, “assault weapon” lethality is the driving factor in their constitutional interest balancing: first, because “assault weapons” are exceptionally lethal, the government has a substantial interest in banning them to ensure public safety; and second, because “assault weapons” are too dangerous for self-defense and there are alternative weapons for protecting oneself, such bans are a permissible burden on the Second Amendment interests²² of those affected. Given the magnitude of disinformation about “assault weapons,”²³ judges must carefully assess whether there is reliable evidence to support these claims. If “assault weapons” are not more lethal than non-banned firearms and are equally useful for self-defense, then courts must find other justifications for upholding laws that keep such firearms out of the hands of law-abiding citizens.

All guns are lethal, of course. Every firearm is capable of causing serious bodily harm or death. Being dangerous is essential to accomplishing a firearm’s core function. The question is whether “assault weapons” like the AR-15 are *far more* dangerous than handguns, shotguns, and other rifles. Ban advocates and federal courts say they are, but why? What makes the AR-15 “exceptionally lethal”? Answers typically come in two forms. The first draws an analogy to military weapons by labeling the AR-15 as an extremely dangerous “weapon of war.” In *Shew v. Malloy*, for example, the state argued to the Second Circuit that “it is common sense that weapons with the same killing capacity as modern military weapons are too dangerous for the public sphere.”²⁴ The second uses metrics based on the AR-15’s rate of fire and terminal performance (wounding ability). Federal courts have relied on these metrics in declaring that the AR-15 has “a capability for lethality—more wounds, more serious, in more

20. 922 F.3d 26, 39 (1st Cir. 2019).

21. *Id.* at 37.

22. See *District of Columbia v. Heller*, 554 U.S. 570, 599 (2008) (holding that the Second Amendment protects the individual right to keep and bear arms for self-defense and other lawful activities).

23. See E. Gregory Wallace, “Assault Weapon” Myths, 43 S. ILL. U. L.J. 193, 196–200, 211–14, 226 (2018).

24. Brief of Defendants-Appellees at 34, *Shew v. Malloy* (No. 14-319-cv), consolidated with *N.Y. State Rifle & Pistol Ass’n v. Cuomo* (NYSRPA), 804 F.3d 242 (2d Cir. 2015).

victims—far beyond that of other firearms in general, including other semiautomatic guns.”²⁵

This Article provides an evidence-based analysis of AR-15’s lethality as justifying bans on these rifles. Part I considers whether the AR-15 is like a combat weapon and thus too lethal for civilian use. Part II examines the claims that the AR-15 is exceptionally lethal because it fires much faster and causes far more serious wounds than non-banned firearms. Part III answers two related questions: first, why have mass shootings with “assault weapons” resulted in much higher casualties? And second, do the same features that make “assault weapons” useful for self-defense also make them the most deadly choice for mass shooters?

I. LETHALITY BY ANALOGY

The lethality by analogy argument begins with the implicit premise that the military selects uniquely lethal small arms for use in combat. The next premise is explicit: there is no real difference between the civilian AR-15 and the military’s combat rifles—the AR-15 is a “weapon of war.”²⁶ The conclusion that follows is that the AR-15 also is extremely dangerous and too lethal for civilian use.²⁷

The military uses the M16 rifle and smaller M4 carbine for combat.²⁸ Both are “select” or “selective” fire weapons, meaning they

25. *Worman*, 922 F.3d at 31 (internal quotation marks omitted) (quoting H.R. REP. NO. 103-489, at 19–20 (1994)); *Kolbe v. Hogan*, 849 F.3d 114, 125, 137 (4th Cir. 2017) (en banc) (same); *N.Y. State Rifle & Pistol Ass’n v. Cuomo (NYSRPA)*, 804 F.3d 242, 262 (2d Cir. 2015) (same).

26. See, e.g., *Kolbe*, 849 F.3d at 121 (disclaiming the power to extend Second Amendment protection to “weapons of war”); *id.* at 124 (describing the banned firearms as “exceptionally lethal weapons of war”); *id.* at 136 (“[T]he AR-15 shares the military features—the very qualities and characteristics—that make the M16 a devastating and lethal weapon of war.”); *id.* at 141 (faulting the dissent for wanting to expand constitutional protection to “exceptionally lethal weapons of war”). For a discussion of political and judicial claims that the AR-15 is a “weapon of war,” see Wallace, *supra* note 23, at 199–211.

27. See *Kolbe*, 849 F.3d at 127 (holding that “banned assault weapons further pose a heightened risk to civilians” and that civilians are given a “military-style advantage” in firefights with law enforcement officers”).

28. The M16 has a twenty-inch barrel and a fixed stock, while the smaller, lighter M4 carbine has a 14.5-inch barrel and an adjustable-length stock. See generally U.S. DEP’T OF THE ARMY, TRAINING CIRCULAR 3-22.9: RIFLE AND CARBINE 2-1–2-10 (2016) [hereinafter ARMY TRAINING CIRCULAR]. Special forces and other select units began

can be fired either in automatic mode or semiautomatic mode by toggling a selector switch on the side of the rifle.²⁹ The M16/M4 is a machine gun—in automatic mode, it fires continuously so long as the shooter presses and holds the trigger.³⁰ Unlike the M16/M4, the civilian AR-15 has a semiautomatic-only firing mechanism, which means that it fires only one round (bullet) with each trigger pull and thus can fire only as fast as the shooter can pull the trigger.³¹

There are several flaws with measuring the AR-15’s lethality by analogy to combat weapons. To begin with, the lethality by analogy argument rests on a dubious first premise. Ban proponents and judges mistakenly assume that the analogous military rifles are themselves exceptionally lethal. The military does not use the M16 and M4 solely because of their hit and kill capability; rather, these rifles incorporate various trade-offs among multiple factors relevant to small unit combat. When the military selects its combat rifles, it considers not just lethality but other factors such as mission adaptability, weight,

using the smaller M4 carbine in the 1990s. Over the last several years, the military has been replacing the M16 with the M4 in infantry units. *See* Christian Beekman, *Here’s Why the US Military is Replacing the M16*, BUS. INSIDER (Oct. 28, 2015, 5:13 PM), <http://www.businessinsider.com/heres-why-the-us-military-is-replacing-the-m16-2015-10>.

29. U.S. DEPT OF THE ARMY, FIELD MANUAL 3-22.9: RIFLE MARKSMANSHIP: M16-/M4-SERIES WEAPONS at 4-11–4-12 (2008) [hereinafter ARMY FIELD MANUAL]. Some earlier versions of the M16/M4 replaced the automatic mode with a three-round burst mode as a mechanical substitute for training soldiers to operate the automatic mode effectively. The burst mode now is being replaced with the automatic mode. *See* Max Slowik, *Army Infantry Beginning Adoption of Upgraded M4A1 Carbines*, GUNS.COM (May 24, 2014, 8:00 AM), <https://www.guns.com/news/2014/05/24/army-infantry-beginning-adoption-of-upgraded-m4a1-carbines>.

30. *See Staples v. United States*, 511 U.S. 600, 602 n.1 (1994) (“[T]he terms ‘automatic’ and ‘fully automatic’ refer to a weapon that fires repeatedly with a single pull of the trigger. That is, once its trigger is depressed, the weapon will automatically continue to fire until its trigger is released or the ammunition is exhausted. Such weapons are ‘machine guns’ within the meaning of the [National Firearms] Act.”); *see also* 26 U.S.C. § 5845(b) (2018) (defining “machinegun” to mean “any weapon which shoots . . . automatically more than one shot, without manual reloading, by a single function of the trigger”).

31. *See Staples*, 511 U.S. at 602 n.1 (“We use the term ‘semiautomatic’ to designate a weapon that fires only one shot with each pull of the trigger, and which requires no manual manipulation by the operator to place another round in the chamber after each round is fired.”); *see also* 18 U.S.C. § 921(a)(28) (2018) (defining “semiautomatic rifle” as “any repeating rifle which utilizes a portion of the energy of a firing cartridge to extract the fired cartridge case and chamber the next round, and which requires a separate pull of the trigger to fire each cartridge”).

reliability, maintenance, and cost.³² To illustrate the trade-offs involved, consider this hypothetical. Suppose bullet A has a 10% chance of killing or incapacitating the enemy in a single battle, but because it is smaller and lighter, the soldier can carry three hundred rounds of A. Suppose bullet B has a 30% chance of killing or incapacitating the enemy in a single battle, but because bullet B is larger and heavier, the soldier can carry only fifty rounds of B. A soldier carries thirty kills with bullet A but only fifteen with bullet B, so bullet A must be better; but in an actual firefight with the enemy, bullet B will be more effective. Should soldiers carry more rounds having less terminal effectiveness or fewer rounds having greater terminal effectiveness?

The military has opted for the former with its combat small arms. The M16 rifle and M4 carbine both fire 5.56x45mm NATO rounds, which is nearly identical in size to the commercial .223 Remington caliber round.³³ This is a smaller and lighter bullet than the .30 caliber rounds previously used by the military in its M1 and M14 combat rifles and currently used by civilians in many modern hunting rifles.³⁴ It also is smaller than the 7.62x39mm round fired from the AK-style rifles used by various countries and terror groups such as

32. See, e.g., Kyle Mizokami, *Why the Army Can't Say Goodbye to the M4 Rifle*, NAT'L INT. (Aug. 2, 2019), <https://nationalinterest.org/blog/buzz/why-army-cant-say-goodbye-m4-rifle-71236> ("No rifle is an ideal fit for the U.S. Armed Forces, which must expect to fight in all environments and climates. A heavier round, harder-hitting round would reduce the amount of ammunition soldiers could carry and place additional burdens on the logistical system. A longer rifle barrel imparts greater range and velocity but make a weapon unwieldy indoors. Design tradeoffs and compromises are inevitable and must be made with existing and future battlefields in mind.").

33. See Robert H. Scales, *Gun Trouble*, ATLANTIC (Jan./Feb. 2015), <https://www.theatlantic.com/magazine/archive/2015/01/gun-trouble/383508/> (explaining that the 5.56mm cartridge used in the M16 "was a modification not of the M14's cartridge but of a commercial Remington rifle cartridge that had been designed to kill small varmints"). Scales is a retired major general and former commandant of the Army War College.

34. See *id.* ("Stoner's little 5.56-mm cartridge was ideal for softening the recoil of World War II infantry calibers in order to allow fully automatic fire. But today's cartridge is simply too small for modern combat."); see also Walter Christian Håland, *Assault Rifle Development in the 70 Years Since the Sturmgewehr*, SMALL ARMS DEF. J. (Mar. 18, 2016), <http://www.sadefensejournal.com/wp/assault-rifle-development-in-the-70-years-since-the-sturmgewehr/> ("The M4 with its round is actually less powerful than most hunting rifles used for animals like deer.").

Islamic State and al-Qaida.³⁵ The 5.56mm round has several advantages, including: (1) its higher velocity makes it “affected less by wind and gravity,” giving it a straighter trajectory, (2) it produces less recoil, permitting more accurate follow-up shots in semiautomatic mode and more control in automatic mode, and (3) its lighter weight allows soldiers to carry more ammunition.³⁶ This last point is critical, given that the modern soldier on the battlefield typically carries more than one hundred pounds—including helmet, body armor, weapons and ammunition, night vision, communications and electronics gear, batteries, medical kit, food, and water.³⁷

Many have criticized the 5.56mm round as lacking sufficient terminal effectiveness in combat.³⁸ Combat veteran and military

35. See Gary Roberts, *Time for a Change: U.S. Military Small Arms Ammunition Failures and Solutions* (May 21, 2008) (presentation slides available at <https://ndiastorage.blob.core.usgovcloudapi.net/ndia/2008/Intl/Roberts.pdf>) [hereinafter Roberts, *Time for a Change*] (discussing how 7.62mm cartridges are often “fired by AK47 rifles commonly used by our opponents”).

36. See Håland, *supra* note 34.

37. See David Hambling, *The Overloaded Soldier: Why U.S. Infantry Now Carry More Weight than Ever*, POPULAR MECHS. (Dec. 26, 2018), <https://www.popularmechanics.com/military/research/a25644619/soldier-weight/>.

38. See, e.g., Joseph P. Avery, *An Army Outgunned: Physics Demands a New Basic Combat Weapon*, MIL. REV., July–Aug. 2012, at 2, 5, (noting “many instances, especially in close quarters, house-to-house combat in Iraq, when the small 5.56mm projectile . . . would zip right through an enemy combatant center mass without causing effective incapacitation, allowing further attacks on our forces”); Glenn Dean & David LaFontaine, *Small Caliber Lethality: 5.56mm Performance in Close Quarters Battle*, WSTIAC Q., Jan. 2008, at 3, 3 (noting multiple reports from U.S. soldiers in Afghanistan that when using 5.56mm rounds in close quarters engagements they “were experiencing multiple ‘through-and-through’ hits on an enemy combatant where the target continued to fight”); Thomas P. Ehrhart, *Increasing Small Arms Lethality in Afghanistan: Taking Back the Infantry Half-Kilometer 49* (Sept. 21, 2009) (unpublished manuscript) (available at <https://apps.dtic.mil/dtic/tr/fulltext/u2/a512331.pdf>) (concluding in part that 5.56mm rounds are proven to be ineffective after two hundred meters and that attempts to improve the lethality of the 5.56mm rounds have failed); Roberts, *Time for a Change*, *supra* note 35 (discussing how, when compared to 5.56mm cartridges, 6.8mm cartridges have proven to have superior terminal effectiveness in all environments); Peter Donaldson, *Infantry Weapons Conference Report*, SMALL ARMS DEF. J. (Jan. 9, 2012), <http://www.sadefensejournal.com/wp/infantry-weapons-conference-report/> (discussing the international movement away from 5.56mm cartridges); Anthony F. Milavic, *The Last ‘Big Lie’ of Vietnam Kills U.S. Soldiers in Iraq*, AM. THINKER (Aug. 24, 2004), https://www.americanthinker.com/articles/2004/08/the_last_big_lie_of_vietnam_ki.htm (“[The] 5.56mm cartridge was nothing more than the full-metal jacket military version of the commercial .223 caliber Remington cartridge. The .223 caliber Remington was and is today commercially advertised and sold as a ‘varmint cartridge’ for hunting groundhogs, prairie dogs[,] and woodchucks.”); Scales, *supra* note 33

small arms expert Jim Schatz explains that “[t]he disturbing failure of the 5.56x45mm caliber to consistently offer adequate incapacitation has been known for nearly [twenty] years.”³⁹ He describes one Special Forces (SF) mission in Afghanistan when an insurgent was shot seven to eight times in the torso, got back up, climbed over a wall, and reengaged other SF soldiers, killing a SF medic. The insurgent then was shot another six to eight times from about twenty to thirty yards before finally being killed by a SF soldier with an M1911 handgun.⁴⁰ Schatz knows experienced law enforcement snipers who no longer use .223/5.56 sniper rifles even though they can shoot superior non-military hollow-point projectiles “because this cartridge is simply not considered an effective ‘one-shot man-stopper.’”⁴¹ Rob Maylor, a former Australian SAS sniper, has “on several occasions witnessed bad guys being hit multiple times by 5.56mm . . . at varying ranges and then continue[] to fight.”⁴² He explains that while the 5.56mm round is designed to yaw and fragment, “[t]his isn’t happening all the time and as a result projectiles are passing through the body with minimal damage.”⁴³ The bestselling book *Black Hawk Down* gives

(arguing that the 5.56mm cartridge is “too small for modern combat” and limits the weapon’s range); Jim Schatz, *Do We Need a New Service Rifle Cartridge?*, SMALL ARMS DEF. J. (Jan. 6, 2012), <http://www.sadefensejournal.com/wp/do-we-need-a-new-service-rifle-cartridge/> (discussing how 5.56mm NATO M855 rounds have shown to have degraded terminal effectiveness beyond 150 meters in M4 carbines and at any range from the shorter-barreled MK18 close-combat carbines due to insufficient striking velocities).

39. Schatz, *supra* note 38. Schatz is a former 82nd Airborne Division infantryman and advanced marksmanship instructor and shooter with the U.S. Army Marksmanship Unit. He currently works as an independent consultant in modern small arms and ammunition.

40. *Id.*

41. *Id.* Schatz stated that he personally knows of one incident where a SWAT officer was tragically killed by an assailant with a shotgun after the assailant was “drilled dead center mass in the torso with a [fifty-five]-grain M193 FMJ 5.56x45mm round at less than [one hundred] yards.” *Id.*

42. Rob Maylor, *5.56mm vs 6.8mm: Can a Better Bullet Keep a Bad Guy Down?*, SOFREP (Mar. 7, 2017), <https://sofrep.com/news/5-56mm-vs-6-8mm-can-better-bullet-keep-bad-guy/>.

43. *Id.*; see also Milavic, *supra* note 38 (recounting numerous instances where enemy combatants were shot repeatedly with the 5.56mm round only to continue fighting).

vivid accounts of the less-than-lethal performance of the Army's green-tip 5.56mm bullet (M855) in the Battle of Mogadishu in 1993.⁴⁴

Military surveys have confirmed these reservations about the 5.56mm round. The Center for Naval Analyses (CNA) surveyed 2,600 soldiers who had fought with small arms in Iraq and Afghanistan.⁴⁵ Twenty percent of M4 users requested a larger caliber bullet than the 5.56mm to give the M4 increased stopping power and lethality.⁴⁶ The CNA report states that "[w]hen speaking to experts and soldiers on site, many commented on the limited ability to effectively stop targets, saying that those personnel targets who were shot multiple times were still able to continue pursuit."⁴⁷ The U.S. Army Small Arms Capabilities-Based Assessment (CBA) noted reports "from individual soldiers and their leaders that they required 'greater lethality' and 'more knockdown power.'"⁴⁸ Former Marine general and Secretary of Defense James Mattis acknowledged that the 5.56mm round lacks sufficient lethality and proposed that the military switch to the larger 6.8mm caliber.⁴⁹ He established the Close Combat Lethality Task Force in 2018 to address the erosion of close-combat capability within U.S. forces, specifically ordering the task force to develop options

44. See MARK BOWDEN, *BLACK HAWK DOWN: A STORY OF MODERN WAR* 208 (1999) (describing how one Delta operator's "rounds were passing right through his targets. When the Sammys were close enough he could see when he hit them. . . . [I]t was like sticking somebody with an ice pick. The bullet made a small, clean hole, and unless it happened to hit the heart or spine, it wasn't enough to stop a man in his tracks. [The operator] felt like he had to hit a guy five or six times just to get his attention."); *id.* at 234–35 (describing how the operator was "disgusted again with this 5.56[mm] ammo" after shooting three Somalis, two of whom struggled to their feet and dragged the third one off).

45. SARA M. RUSSELL, *SOLDIER PERSPECTIVES ON SMALL ARMS IN COMBAT* 1 (Dec. 2006).

46. *Id.* at 30.

47. *Id.* at 29. See ANDREW FEICKERT, CONG. RSCH. SERV., RS22888, *THE ARMY'S M-4 CARBINE: BACKGROUND AND ISSUES FOR CONGRESS* 4 (2010) ("The 'larger bullet' recommendation for lethality purposes may, in fact, be a valid recommendation based on observations from Iraq and Afghanistan, but the 'bigger bullet debate' has been a source of contention for many small arms experts ever since the Army adopted the [5.56mm] M-16 during Vietnam in lieu of the [7.62mm] M-14 rifle.").

48. FEICKERT, *supra* note 47, at 6.

49. See Schatz, *supra* note 38 (describing Mattis's visit to Walter Reed Hospital where he heard multiple accounts of 5.56mm failures, including one Marine lieutenant who "lost a leg to a suicide bomber when he and other Marines emptied a magazine (5.56x45mm) into the man charging them, at close range" (internal quotation marks omitted)); see also Russ Read, *Mattis Admits the M16 Lacks Lethality*, DAILY CALLER (Jan. 12, 2017, 12:54 PM), <https://dailycaller.com/2017/01/12/mattis-admits-its-time-to-upgrade-the-m16s-lethality/#ixzz4Vrn0JLbj>.

including “more lethal and discriminating individual weapons systems.”⁵⁰

There has been longstanding debate within the military community about which caliber round is most effective in combat. Military testing performed in the late 1920s and early 1930s confirmed that the intermediate .256 caliber (6.5mm) round and .276 caliber (7.0mm) Pedersen round were more effective at distances under three hundred yards than the military’s standard .30-06 round.⁵¹ Douglas McArthur, then Chief of Staff of the Army, rejected the test results and chose the less effective .30-06 round because the Army had huge stockpiles left over from World War I and because moving to a new round would complicate logistics.⁵² Modern testing supports the same conclusion about the most effective round for combat rifles. Based on data from more than 10,000 test shots at various distances with multiple caliber rounds, the 2006 U.S. Joint Service Wound Ballistics Integrated Product Team (JSWB-IPT) concluded that the optimum caliber for terminal performance is not the 5.56mm round but the 6.8mm round.⁵³ The next generation of combat rifles likely will use a more effective intermediate caliber round between 6.5 and 7.0mm rather than the smaller 5.56mm round.⁵⁴

None of this suggests that the military’s M16 rifle and M4 carbine are less than lethal on the battlefield; to the contrary, they have

50. Nick Adde, *New 6.8 mm Round a Game-Changer for Ground Troops*, NAT’L DEF., 2009, at 8, 9 (quoting Defense Secretary Mattis).

51. See Ehrhart, *supra* note 38, at 8–9. See generally THOMAS L. MCNAUGHER, MARKSMANSHIP, MCNAMARA AND THE M16 RIFLE: ORGANIZATIONS, ANALYSIS AND WEAPONS ACQUISITION 13–15 (1979) (discussing the history of the military’s rifle caliber debate).

52. See Ehrhart, *supra* note 38, at 9.

53. See Roberts, *Time for a Change*, *supra* note 35 (stating that “the clear and unequivocal best performing cartridge in the JSWB-IPT testing was 6.8mm.”); Schatz, *supra* note 38 (quoting the draft report stating that “[t]he best performing systems emphasizing tissue damage, on the average, in this study were of larger caliber than 5.56mm,” that “[t]he 6.8mm performance observed in this test suggests that an intermediate caliber is the answer to the trade-off balance issue,” and that “[t]he 6.8 mm projectile had a near optimum balance of mass, velocity, and configuration to maintain its effectiveness, even at lower impact velocity.” (internal quotation marks omitted)).

54. See Scales, *supra* note 33; Todd South, *New Rifle, Bigger Bullets: Inside the Army’s Plan to Ditch the M4 and 5.56*, ARMYTIMES.COM (May 7, 2017), <https://www.armytimes.com/news/your-army/2017/05/07/new-rifle-bigger-bullets-inside-the-army-s-plan-to-ditch-the-m4-and-5-56/>.

proven capability to kill or incapacitate. But the lethality by analogy argument only works if the AR-15 is like military weapons which themselves are exceptionally lethal. Reports about the terminal underperformance of the smaller projectile fired by the M16/M4 suggest that these rifles are adequately lethal but not exceptionally so when compared to alternatives.

There are additional reasons why the lethality by analogy argument does not work. As a simple factual matter, the civilian semiautomatic AR-15 is not a combat weapon. No national military uses the AR-15 or any other semiautomatic-only rifle as its standard service rifle.⁵⁵ Because the AR-15 lacks selective-fire capability—it does not fire in automatic (machine gun) mode like the M16/M4—it is neither designed for nor used on the battlefield.⁵⁶ Ban supporters try to downplay this distinction,⁵⁷ but as attorney and former infantry officer Dennis Chapman points out, selective-fire capability “is the single, essential feature that makes a military firearm more useful in combat than its civilian counterpart.”⁵⁸ The AR-15 fires much slower than a machine gun, and therefore lacks the utility of a modern military combat rifle.⁵⁹

The military weapon analogy also is used to highlight the AR-15’s “military features”—pistol grip, barrel shroud, flash suppressor, and adjustable stock—that supposedly make the AR-15 exceptionally dangerous. Three circuits have concluded that these features give the AR-15 a lethal capability “far beyond” other firearms.⁶⁰ They simply are wrong about this as anyone familiar with the AR-15 knows. While such features may make the AR-15 look menacing, they do not render the AR-15 more deadly by making it fire faster, shoot with much

55. Wallace, *supra* note 23, at 205–06.

56. For an extended discussion of why the AR-15 is not a “weapon of war” because it lacks the capability for automatic fire, see *id.* at 207–11.

57. See, e.g., Brief of Defendants-Appellees at 23, *Worman v. Healey*, 922 F.3d 26 (1st Cir. 2019) (No. 18-1545) (“The U.S. military does not consider the capacity for automatic fire to be a critical feature that makes the firearm military in nature.”).

58. Dennis Chapman, *The ‘Weapons of War’ Myth*, PULSE | LINKEDIN (Dec. 7, 2015), <https://www.linkedin.com/pulse/weapons-war-myth-dennis-chapman> [hereinafter Chapman, *Myth*]; see Dennis Chapman, *Firearms Chimera: The Counter Productive Campaign to Ban the AR-15 Rifle*, 8 BELMONT L. REV. (forthcoming 2020) (manuscript at 13) (available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3466567) [hereinafter Chapman, *Firearms Chimera*] (“Automatic and selective fire is the only significant truly military firearms feature.”).

59. See *infra* text accompanying notes 89–93.

60. *Kolbe v. Hogan*, 849 F.3d 114, 137 (4th Cir. 2017) (en banc); *N.Y. State Rifle & Pistol Ass’n v. Cuomo* (*NYSRPA*), 804 F.3d 242, 262 (2d Cir. 2015); see *Heller v. District of Columbia* (*Heller II*), 670 F.3d 1244, 1262–63 (D.C. Cir. 2011).

greater accuracy, or impact with far more power.⁶¹ They mostly serve the same ergonomic functions as similar features on non-banned firearms, making the AR-15 easier and safer to use.⁶² To be sure, by making the AR-15 easier to use they also can make it marginally more accurate, but there is no evidence that such features materially increase the AR-15's lethality in mass public shootings or other criminal activities.⁶³ Having these features on multiple military rifles may increase accuracy in the aggregate and make a small difference in infantry combat.⁶⁴ But mass public shootings are not like small unit combat—typically there is a lone shooter and no one shooting back.⁶⁵ Any marginal increase in the accuracy of a single weapon due to these features will have little, if any, lethal effect.⁶⁶ Having a slightly more accurate weapon will make no real difference to the mass shooter, especially when firing from an unsupported position while standing or moving.

The lethality by analogy argument also proves too much. Civilians have been using “weapons of war” since musket days, often with little

61. Taking advantage of public and judicial ignorance about firearms, gun-control advocates emphasize these “scary-looking” features as proof of the AR-15's enhanced lethality. *See, e.g.*, Josh Sugarman, *Assault Weapons and Accessories in America*, VIOLENCE POL'Y CTR., <http://www.vpc.org/studies/awaconc.htm> (last visited Feb. 21, 2021) (“The [assault] weapons’ menacing looks, coupled with the public’s confusion over fully automatic machine guns versus semi-automatic assault weapons—anything that looks like a machine gun is assumed to be a machine gun—can only increase the chance of public support for restrictions on these weapons.”).

62. *See* Wallace, *supra* note 23, at 226–34 (explaining the function and effects of these features). I do not claim that these features are merely cosmetic; rather, they are functional, but their functions do not make the AR-15 exceptionally lethal.

63. *See* KOPER ET AL., *supra* note 6, at 80 n.94 (“While it is conceivable that changing features of [assault weapons] other than their magazines might prevent some gunshot victimizations, available data provide little if any empirical basis for judging the likely size of such effects. . . . While [pistol grips] may prove useful in military contexts . . . it is unknown whether civilian attacks with semiautomatic rifles having pistol grips claim more victims per attack than do those with other semiautomatic rifles.”).

64. Chapman, *Myth*, *supra* note 58 (“The ergonomic features that proponents of an ‘assault’ weapons ban view as ‘military’ in nature are valuable in combat. By making the firearm more comfortable and more convenient to use, they offer the potential to improve the individual [s]oldier’s marksmanship. Not dramatically, usually, but to a small degree. But in a situation as fiercely competitive as infantry combat, a small advantage enjoyed by a number of [s]oldiers individually can have enough of an impact cumulatively to influence the outcome of the battle.”).

65. *See generally id.* (discussing the contextual differences between typical mass shootings and military combat).

66. *See id.*

or no difference between military and civilian versions.⁶⁷ Civilian firearms that are used or have been used by military forces include the most popular handguns in the world—the iconic Browning-designed 1911, Sig Sauer P226, Glock 17, and Beretta 92FS—as well as familiar hunting rifles and shotguns, such as the Remington 700 bolt-action rifle and Remington 870 and Mossberg 500 pump-action shotguns.⁶⁸ If firearms are exceptionally lethal because they are military or military-style weapons, then a wide array of popular handguns and long guns are too dangerous for civilian use.

The final flaw in the “weapons of war” analogy is that the Supreme Court repeatedly has recognized that the Second Amendment protects military or military-style small arms commonly used by civilians.⁶⁹ As *District of Columbia v. Heller* explains, “[i]n the colonial and revolutionary era, [small arms] weapons used by militiamen and weapons used in defense of person and home were one and the same.”⁷⁰ The Court in *United States v. Miller* recognized that citizens have the right to possess weapons that are part of the militia’s “ordinary military equipment” or that “could contribute to the common defense.”⁷¹ While *Heller* rejects the dissent’s narrow reading of *Miller* to protect “only those weapons useful in warfare”⁷² (which, if true, would prove this point with even greater force), it clarifies that the “ordinary military equipment” referenced in *Miller* also includes civilian small arms commonly used for lawful purposes.⁷³ Such firearms do not lose their constitutional protection because they are “weapons of war.”

67. Wallace, *supra* note 23, at 200.

68. *See id.* at 201–02.

69. *See id.* at 202–03.

70. 554 U.S. 570, 624–25 (2008) (internal quotation marks omitted) (quoting *State v. Kessler*, 614 P.2d 94, 98 (Or. 1980)).

71. 307 U.S. 174, 178 (1939) (citing *Aymette v. State*, 21 Tenn. (1 Hum.) 154, 158 (1840)).

72. 554 U.S. at 624–25 (emphasis added). The *Heller* dissenters argued that the Second Amendment protects only military-style arms. *See id.* at 636 (Stevens, J., dissenting) (“The Second Amendment plainly does not protect the right to use a gun to rob a bank; it is equally clear that it *does* encompass the right to use weapons for certain military purposes.”); *id.* at 646 (noting that the phrase “[t]o keep and bear arms” describes a “unitary right: to possess arms if needed for military purposes and to use them in conjunction with military activities”).

73. *Id.* at 624–25 (majority opinion).

II. LETHALITY AS A METRIC

Ban proponents also argue that the AR-15 is exceptionally lethal because it fires much faster and causes far more serious wounds than other firearms. These two metrics are used in all five federal circuit court cases. The First, Second, and Fourth Circuits identically asserted that the banned weapons have “a capability for lethality—more wounds, more serious, in more victims—far beyond that of other firearms in general, including other semiautomatic guns.”⁷⁴ The D.C. Circuit declared that the banned weapons’ rate of fire and large-capacity magazines “greatly increase the firepower of mass shooters.”⁷⁵ The Seventh Circuit concluded that “assault weapons” can be more dangerous in the aggregate than other firearms because they “enable shooters to fire bullets faster” and because their “spray fire” design make them more dangerous in mass shootings.⁷⁶ Most recently, the First Circuit emphasized the terminal effects of the AR-15, noting that “such weapons can fire through walls, risking the lives of those in nearby apartments or on the street,” and citing medical sources asserting that “assault weapons” cause far more massive and devastating wounds than other firearms.⁷⁷

What makes one gun more dangerous or deadly than another? While there is no official or formal standard for measuring firearm lethality, analysis typically focuses on the projectile (bullet) the gun fires and how the gun fires that projectile. Projectile factors include its size (caliber), shape, construction, muzzle velocity (speed of the bullet as it leaves the weapon), and terminal ballistics (bullet–tissue interaction). Firearm factors include (1) the firearm’s speed in putting bullets on the intended target, including its effective rate of fire, magazine capacity, and features that make it easier or faster to deploy and fire, and (2) the firearm’s accuracy, which typically depends on barrel design, quality, and length, aiming devices, and recoil. In short,

74. *Worman v. Healey*, 922 F.3d 26, 31 (1st Cir. 2019) (internal quotation marks omitted) (quoting H.R. REP. NO. 103-489, at 19–20 (1994)); *Kolbe v. Hogan*, 849 F.3d 114, 125, 137 (4th Cir. 2017) (en banc) (same); *N.Y. State Rifle & Pistol Ass’n v. Cuomo (NYSRPA)*, 804 F.3d 242, 262 (2d Cir. 2015) (same).

75. *Heller v. District of Columbia (Heller II)*, 670 F.3d 1244, 1263 (D.C. Cir. 2011) (internal quotation marks omitted) (citations omitted).

76. *Friedman v. City of Highland Park*, 784 F.3d 406, 409, 411 (7th Cir. 2015). The claim that the civilian semiautomatic-only AR-15 is designed for “spray fire” is factually false. See Wallace, *supra* note 23, at 211–22.

77. *Worman*, 922 F.3d at 37, 39–40.

everything else being equal, a gun’s lethality typically depends on how fast it fires, how accurately it shoots, and how destructively it strikes.

But everything else is never equal in real shootings. A firearm’s actual lethality involves several additional variables. Most critical is the bullet’s point of impact. A small-caliber round to the brain, spinal cord, or heart has a far greater chance of causing serious damage or death than a large-caliber round to an extremity. That is why the skill and training of the shooter at shot placement is the most important factor for firearm lethality—any gun will be more dangerous in the hands of a skilled shooter than a novice. The shooter’s intent and motivation to do harm likewise may affect the firearm’s lethality. Even a small-caliber handgun can be very effective in the hands of a determined shooter. Proximity to the target is another factor. In some circumstances, a small, concealable handgun may be more lethal than a larger firearm because the shooter can carry it much closer to the intended victim and deliver a lethal shot. When concealment is unnecessary, a shotgun may prove more deadly to a single target in close proximity, while a scoped bolt-action rifle will pose a greater lethal threat to a single target several hundred yards away.

Given these variables, generalizations about the lethality of “assault weapons” based solely on their rate of fire, accuracy, and bullet impact will never accurately describe or predict their actual lethality. Firearm lethality is a complex subject, not easily reduced to static comparisons or simplistic catchphrases. It may be impossible to speak meaningfully and consistently in policy debates or legal decisions about the comparative lethality of “assault weapons.”

Federal courts nevertheless have upheld “assault weapon” bans on the ground that the banned weapons are exceptionally lethal. A firearm’s rate of fire, accuracy, and terminal performance are questions of fact that can be established by firearms and ballistics experts, objective testing, and military documentation. Instead of consulting such evidence to determine whether “assault weapons” are more dangerous than other firearms, federal judges have relied on proof by assertion, repeatedly citing unsupported claims by ban advocates, federal agencies justifying their policy decisions, and individuals having little or no experience with how the banned firearms operate.⁷⁸ They have taken such assertions at face value without examining whether they are true because they support the result the judges want to reach. These judges have shown little

78. See Wallace, *supra* note 23, at 195 (using *Kolbe* as an example); *infra* text accompanying notes 79–82.

willingness to engage in a rigorous and impartial review of relevant facts before drawing legal conclusions about the relative dangerousness of “assault weapons.” Their uncritical acceptance of pro-ban claims about “assault weapon” lethality calls into question the legitimacy of their decisions.

Facts matter. What follows is an evidence-based comparative analysis of the AR-15’s lethality based on its rate of fire, accuracy, and terminal ballistics.

A. *The AR-15’s Rate of Fire*

A firearm with a high rate of fire can be more dangerous than other firearms, especially when intended victims are crowded in a single place as sometimes happens in mass public shootings. More bullets fired can mean more victims and more wounds in each victim. Firearms with the highest rate of fire are automatic weapons—typically called machine guns—which fire continuously so long as the shooter presses and holds the trigger.

Judicial claims about the AR-15’s lethality turn largely on comparing its rate of fire to that of a machine gun. *Heller II* declares that semiautomatic firearms like the AR-15 “fire almost as rapidly as automatics.”⁷⁹ *Kolbe* concludes that the rate of fire for the semiautomatic-only AR-15 is “nearly identical” to the military M16 firing in automatic mode.⁸⁰ It claims that any difference in the rates of fire is “slight,” citing as authority a 1994 congressional report stating that “[s]emiautomatic weapons can be fired at rates of [three hundred] to [five hundred] rounds per minute, making them virtually indistinguishable in practical effect from machine guns.”⁸¹ Both *Heller II* and *Kolbe* assert that a semiautomatic rifle like the AR-15 can empty a thirty-round magazine in five seconds.⁸² *Heller II* concludes that “it is difficult to draw meaningful distinctions between the AR-15 and the M-16.”⁸³

79. 670 F.3d at 1263 (internal quotation marks omitted) (citation omitted).

80. *Kolbe v. Hogan*, 849 F.3d 114, 136 (4th Cir. 2017) (en banc).

81. *Id.* at 125 (internal quotation marks omitted) (quoting H.R. REP. NO. 103-489, at 18 (1994)).

82. *Id.* at 125, 136; 670 F.3d at 1263.

83. 670 F.3d at 1263 (citations omitted).

These assertions about the AR-15’s rate of fire are badly flawed.⁸⁴ The cited sources for the rate-of-fire claims are not firearms experts, military operators, or even experienced AR-15 shooters; instead, they are advocates for “assault weapon” bans.⁸⁵ *Kolbe*’s “[three hundred] to [five hundred] rounds per minute” figure can be traced to 1991 congressional testimony from Dewey R. Stokes, president of the national Fraternal Order of Police and a leading gun-control advocate.⁸⁶ *Heller II*’s “empty a [thirty-round] magazine in five seconds” figure comes from Brian Siebel, an attorney and lobbyist for the Brady Center to Prevent Gun Violence, a leading gun-control organization, who obtained that figure from a 1988 police trade magazine article by Joseph McNamara, another gun-control advocate.⁸⁷ The claims in *Kolbe* and *Heller II* about the AR-15’s high rate of fire are based on two unsubstantiated reports three decades old from ban proponents.⁸⁸

1. Measuring the AR-15’s Rate of Fire

The AR-15 has a slower firing mechanism than the military’s M16 rifle and smaller M4 carbine. As explained above, the M16/M4 are selective-fire weapons, meaning they can be fired either in automatic or semiautomatic mode.⁸⁹ When firing in automatic mode, they have a cyclic (mechanical) rate of fire of seven hundred to nine hundred rounds per minute (twelve to fifteen rounds per second),⁹⁰ and thus can empty a standard thirty-round magazine in 2–2.5 seconds. By contrast, the civilian AR-15 lacks the ability to fire multiple shots with one pull of the trigger and therefore does not fire nearly as fast as an

84. See generally Wallace, *supra* note 23, at 211–26 (providing a more detailed refutation of these assertions).

85. *Id.* at 195.

86. *Id.* at 220–21 (citing H.R. REP. NO. 103-489, at 18).

87. *Id.* at 221 (citation omitted). For further discussion of Stokes’s and McNamara’s pro-ban advocacy, see generally Eric C. Morgan & David B. Kopel, *The “Assault Weapon” Panic: Political Correctness Takes Aim at the Constitution* (Nat’l Crim. Just. Reference Serv. Indep.: Indep. Inst. Issue Paper, Paper No. 12-91, 1993).

88. See Brief of Amicus Curiae Law Enforcement Groups et al. in Support of Petitioners’ Petition for Writ of Certiorari at 16, *Kolbe v. Hogan*, 849 F.3d 114 (4th Cir. 2017) (No. 17-127) (“Determinations by courts that affect the fundamental constitutional rights of citizens should not be based on uncritical acceptance of fifth hand, unverified, anecdotal reports.”).

89. See *supra* notes 28–30 and accompanying text.

90. ARMY FIELD MANUAL, *supra* note 29, at 2-1. A cyclic rate of fire measures how fast the weapon can fire mechanically and does not consider operator factors such as reaction time, reloading, and aiming.

automatic weapon. Because it has a semiautomatic-only firing mechanism, it fires only one round with each trigger pull and thus can fire only as fast as the shooter can pull the trigger.

Judicial declarations about the AR-15's high rate of fire are both counterintuitive and counterfactual, as anyone who has operated the AR-15 knows. To fire a semiautomatic rifle three hundred to five hundred per minute, as *Kolbe* claims, the shooter must pull the trigger *five to eight times per second* and maintain that rate for sixty seconds. To empty a thirty-round magazine in five seconds, as both *Heller II* and *Kolbe* claim, the shooter must pull the trigger *six times per second* for that span. Only the world's fastest expert shooters using highly-tuned AR-15 rifles can pull the trigger five or six times in one second while firing at a single stationary target, and that rate cannot be maintained for an entire minute.⁹¹ The average shooter with an AR-15 will be much slower, firing at most two to three rounds per second and thus, taking ten or more seconds to empty a thirty-round magazine.⁹² An inexperienced shooter will take even longer.⁹³

Because the AR-15 fires much slower than a machine gun, it lacks the lethality of a machine gun. Consider this: A typical shooter firing a military M16 in automatic mode can empty a one hundred-round magazine in less time than it would take the same shooter firing a civilian AR-15 to empty a thirty-round magazine. If that shooter fires indiscriminately into a crowded bar, church, or classroom, the fully automatic M16 would produce far more casualties than the semiautomatic AR-15, launching some seventy more bullets into the crowd. Using either weapon in such a scenario would be tragic, but the automatic rifle much more so. And yet, relying on *Heller II* and *Kolbe*, one federal district court recently declared that the variance

91. See Wallace, *supra* note 23, at 215–18.

92. See *id.* at 218; see also Angela Sauaia et al., *Case Fatality Rates Do Not Tell the Whole Story*, 229 J. AM. COLL. SURGEONS 441, 442 (2019) (“[W]e have personally documented that a non-experienced individual can fire [thirty] bullets from an [AR-15] within [ten] seconds.”). Louis Klarevas writes that an average shooter will fire two rounds per second from an AR-15, which would require about fifteen seconds to empty a thirty-round magazine. See LOUIS KLAREVAS, *RAMPAGE NATION: SECURING AMERICA FROM MASS SHOOTINGS* 211–12 (2016).

93. See Tim Dickinson, *All-American Killer: How the AR-15 Became Mass Shooters' Weapon of Choice*, ROLLING STONE (Feb. 22, 2018, 4:20 PM), <https://www.rollingstone.com/politics/politics-features/all-american-killer-how-the-ar-15-became-mass-shooters-weapon-of-choice-107819/> (explaining that the author, who had never shot a firearm before, fired twenty rounds from an AR-15 at a single stationary target in less than a minute).

between automatic and semiautomatic rates of fire is a “distinction without a difference.”⁹⁴

The AR-15’s rate of fire slows even more when the shooter engages in aimed semiautomatic fire at multiple or moving targets, as often occurs in mass public shootings.⁹⁵ The United States Army Field Manual on Rifle Marksmanship (Army Field Manual) explains that “[t]he most important firing technique during fast-moving, modern combat is rapid semiautomatic fire. It is the most accurate technique of placing a large volume of fire on poorly defined targets or target areas, such as short exposure, multiple, or moving targets.”⁹⁶ *Kolbe* asserts that the civilian AR-15, like its military counterparts, is designed “to shoot a large number of rounds across a battlefield at a high rate of speed”⁹⁷ but fails to quantify how large the number of rounds or how high the speed of fire. Military documents supply the missing numbers by describing the rate of “rapid semiautomatic fire” for the M16/M4 when shooting at multiple or moving targets. Because the military M16/M4 and civilian AR-15 have identical rates of semiautomatic fire, these numbers also apply to the AR-15.

What the military counts as a “large volume of fire” when using “rapid semiautomatic fire” is much slower than the rates cited in *Kolbe* and *Heller II*. The Army Field Manual specifies that rapid semiautomatic fire for the M16/M4 “will result in a well-aimed shot every one to two seconds.”⁹⁸ The Manual sets the maximum *effective* rate of fire for an M16/M4 in semiautomatic mode at forty-five rounds

94. *Rupp v. Becerra*, 401 F. Supp. 3d 978, 987 (C.D. Cal. 2019); *see also* Jonathan E. Lowy, *Comments on Assault Weapons, the Right to Arms, and the Right to Live*, 43 HARV. J.L. & PUB. POL’Y 375, 382 (2020) (describing the difference between automatic and semiautomatic fire as “not great” and “not much”).

95. *See* Dave B. Kopel, *Rational Basis Analysis of “Assault Weapon” Prohibition*, 20 J. CONTEMP. L. 381, 389 (1994) (“[T]he only meaningful rate of fire for a weapon is how fast a person, shooting at actual targets, can hit those targets.”). The U.S. Army’s Rifle and Carbine Training Circular similarly explains:

The rifleman’s primary role is to engage the enemy with well-aimed shots. . . . In this capacity, the rate of fire for the M4 rifle is not based on how fast the [s]oldier can pull the trigger. Rather, it is based on how fast the [s]oldier can consistently acquire and engage the enemy with accuracy and precision.

ARMY TRAINING CIRCULAR, *supra* note 28, at 5.

96. ARMY FIELD MANUAL, *supra* note 29, at 7-8.

97. *Kolbe v. Hogan*, 849 F.3d 114, 125 (4th Cir. 2017) (en banc) (internal quotation marks omitted) (citation omitted).

98. ARMY FIELD MANUAL, *supra* note 29, at 7-9.

per minute.⁹⁹ This means that for aimed semiautomatic fire at multiple or moving targets, the rate for M16/M4 rifles typically is less than one shot per second. This rate is slower because the shooter needs to acquire a good sight picture for each target; the interval it takes to obtain that sight picture dictates the timing of the next shot. While the M16/M4's lower recoil enables the shooter to get back on multiple or moving targets more quickly for follow-up shots, it does not increase the effective rate of fire beyond forty-five rounds per minute. Even at that rate, the rifle's barrel becomes extremely hot, degrading accuracy and function. The M16 and M4 were not designed for prolonged rapid semiautomatic fire. The Army Field Manual states that the maximum *sustained* rate of fire for the M16/M4—the rate at which the weapon can continue to be fired indefinitely without overheating—is even lower at twelve to fifteen rounds per minute, which is one round every four to five seconds.¹⁰⁰ These rates change the lethality assessment considerably, with the capability for aimed fire “measured in seconds per shot,” not shots per second.¹⁰¹

It is quite clear that federal court claims about the semiautomatic AR-15's high rate of fire are far off the mark. The actual rate for an average shooter firing indiscriminately (or at a single stationary target) will not exceed two to three shots per second over a short period of time.¹⁰² Trained shooters will fire slightly faster while inexperienced shooters will be slower. The highest rate of aimed fire to achieve hits on multiple or moving targets typically will be slower than one shot per second and, again, for a short duration to avoid barrel overheating. These rates are nowhere near machine-gun-like rates for the semiautomatic AR-15 asserted by *Heller II* and *Kolbe*.

To the extent rates of fire can be known in actual mass shootings with “assault weapons,” they do not exceed two to three shots per second over a short duration. In a recording of the Orlando nightclub shooting, the shooter is heard firing twenty-four shots in nine seconds,

99. *Id.* at 2-1.

100. *Id.*

101. Dennis P. Chapman, *Features and Lawful Common Uses of Semi-Automatic Rifles* 28 (Soc. Sci. Rsch. Network (SSRN) Working Paper, Paper No. 3436512, 2019), <https://ssrn.com/abstract=3436512> (“[T]he *practical* rates of fire for semi-automatics are measured in *seconds per shot*, not the scores of shots per second often claimed for them.”).

102. See ARMY FIELD MANUAL, *supra* note 29, at 2-1.

a rate of about 2.7 shots per second.¹⁰³ The Dayton nightclub shooter fired forty-one shots in thirty seconds, which is about 1.4 shots per second.¹⁰⁴ Sounds of thirty shots can be heard in a recorded twenty-seven-second call to 911 during the Aurora movie theater shooting, which is slightly more than one shot per second.¹⁰⁵

The only exception is the Las Vegas shooting, where the shooter apparently used bump stocks—an accessory that replaces the original stock—to increase the AR-15’s rate of fire to nine rounds per second, according to an audio recording of the incident.¹⁰⁶ The ATF has since ruled that bump stocks come within the definition of “machineguns” under federal law and must be treated as such.¹⁰⁷ All existing bump stocks must be destroyed or be abandoned at an ATF office.¹⁰⁸ Whether the bump stock rule is lawful remains to be seen, but it is proportional in that it regulates the firearm accessory rather than

103. Larry Buchanan et al., *Nine Rounds a Second: How the Las Vegas Gunman Outfitted a Rifle to Fire Faster*, N.Y. TIMES (Oct. 5, 2017), <https://www.nytimes.com/interactive/2017/10/02/us/vegas-guns.html>. The Orlando shooter used a semiautomatic Sig Sauer MCX carbine, which is similar to an AR-15. Larry Buchanan et al., *How They Got Their Guns*, N.Y. TIMES (Feb. 16, 2018), <https://www.nytimes.com/interactive/2015/10/03/us/how-mass-shooters-got-their-guns.html>.

104. Holly Yan et al., *The Dayton Gunman Killed 9 People by Firing 41 Shots in 30 Seconds. A High-Capacity Rifle Helped Enable that Speed*, CNN (Aug. 5, 2019, 5:57 PM), <https://www.cnn.com/2019/08/05/us/dayton-monday-shooter-stopped-in-seconds/index.html>.

105. Casey Wian et al., *‘He Intended to Kill Them All,’ Prosecutor in Theater Shooting Says*, CNN (Jan. 9, 2013, 7:14 PM), <https://www.cnn.com/2013/01/09/justice/colorado-theater-shooting/index.html>. For average rates of fire in other mass shootings, see Wallace, *supra* note 23, at 222–25.

106. Larry Buchanan et al., *What is a Bump Stock and How Does It Work?*, N.Y. TIMES (Mar. 28, 2019), <https://www.nytimes.com/interactive/2017/10/04/us/bump-stock-las-vegas-gun.html>. It’s not entirely certain that bump stocks were used in the Las Vegas shooting, but it seems likely given the rate of fire heard in the audio recording and the fact that more than half the rifles found in the shooter’s hotel room were equipped with bump stocks. See LAS VEGAS METRO. POLICE DEP’T, CRIMINAL INVESTIGATIVE REPORT OF THE 1 OCTOBER MASS CASUALTY SHOOTING 96–104, 125 (2018). See generally Bureau of Alcohol, Tobacco, Firearms & Explosives, Las Vegas Recovered Weapons and Ammunition (n.d.) (presentation slides available at <https://archive.org/details/ATFVegasWeaponsAmmunition/mode/2up>).

107. Bump-Stock-Type Devices, 83 Fed. Reg. 66,514 (Dec. 26, 2018) (to be codified at 27 C.F.R. pt. 447, 478, 479). The new rule, which took effect March 26, 2019, has been challenged in several court cases. See, e.g., Guedes v. Bureau of Alcohol, Tobacco, Firearms & Explosives, 920 F.3d 1, 6 (D.C. Cir. 2019) (denying motion for preliminary injunction to halt rule from going into effect), *cert. denied*, 140 S. Ct. 789 (2020); Ilya Shapiro et al., Gun Owners of America v. Barr, CATO INST.: LEGAL BRIEFS (June 25, 2019), <https://www.cato.org/publications/legal-briefs/gun-owners-america-v-barr>.

108. *Bump Stocks*, BUREAU OF ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, <https://www.atf.gov/rules-and-regulations/bump-stocks> (last updated Feb. 21, 2019).

banning the entire firearm. Heightened constitutional scrutiny should require the more narrowly tailored regulation.

The fact that the AR-15's rate of fire can be increased by "bump-firing" does not make the AR-15 exceptionally lethal. Bump-fire is notoriously inaccurate, erratic, and difficult, thereby decreasing the firearm's effectiveness.¹⁰⁹ That is why bump fire is not used by military, law enforcement, or civilian target shooters. With the apparent exception of Las Vegas, there is no evidence that bump fire has been used in mass public shootings or other criminal activity.¹¹⁰ Furthermore, the Las Vegas shooter's increased rate of fire was not the only factor contributing to the tragically-high casualty count. He fired for more than ten minutes from an elevated, stationary, and secluded position into a densely-packed crowd of 22,000 people who had limited avenues of escape.¹¹¹

2. Comparing the AR-15's Rate of Fire

It is widely assumed that "assault weapons" like the AR-15 are more lethal because they fire bullets much faster than other firearms. Indeed, to those unfamiliar with modern semiautomatic firearms, the AR-15's ability to fire more than one bullet per second seems very fast. But nearly identical rates of fire can be achieved by semiautomatic handguns, shotguns, and non-banned rifles. Because all semiautomatic firearms operate the same way—one round fired for each trigger pull with automatic loading of the next round—it is not

109. See, e.g., Destroy Everything, *How to Bump Fire*, YOUTUBE (Jan. 17, 2018), <https://www.youtube.com/watch?v=9Yjcj9jBvIY> (explaining how to bump fire without a bump stock and showing inaccuracy of bump-firing from hip); Jerry Miculek, *Miculek VS. Bump Stock*, YOUTUBE (Jan. 11, 2019), <https://www.youtube.com/watch?v=grgfKJT4Z48> (showing fast-shooter Jerry Miculek's mostly unsuccessful attempt to operate a bump stock).

110. See Harry Cheadle, *A 'Bump Stock' Ban Would Barely Affect Gun Violence in America*, VICE: LAS VEGAS SHOOTING (Oct. 5, 2017, 4:39 PM), https://www.vice.com/en_us/article/wjxypw/a-bump-stock-ban-would-barely-affect-gun-violence-in-america.

111. See Geoffrey Mohan, *The Trigonometry of Terror: Why the Las Vegas Was So Deadly*, L.A. TIMES (Oct. 4, 2017, 3:00 AM), <https://www.latimes.com/nation/la-las-vegas-shooting-live-updates-carnage-concert-leaves-50-dead-100-injured-20171002-htmlstory.html#the-trigonometry-of-terror-why-the-las-vegas-shooting-was-so-deadly>; Yuliya Talmazan, *Las Vegas Shooter's Position in Mandalay Bay Room Amplified Massacre*, NBC NEWS (Oct. 2, 2017, 10:52 AM), <https://www.nbcnews.com/storyline/las-vegas-shooting/las-vegas-shooter-s-position-mandalay-bay-room-amplified-massacre-n806491>.

surprising they have comparable rates of fire. The AR-15 is no more lethal in its rate of fire than other semiautomatic firearms.

There is little if any difference between the rates of fire for the semiautomatic AR-15 and a semiautomatic handgun. The average shooter can fire a semiautomatic handgun at a rate of about two to three rounds per second while pointing at a single stationary target. In a study of police-attacker shooting performance, the Force Science Research Center found that a large majority of inexperienced handgun shooters in the test group could fire three rounds from a semiautomatic handgun in 1.5 seconds (two rounds per second), and some were able to fire three rounds in one second.¹¹² After consulting firearms experts, Louis Klarevas in *Rampage Nation: Securing America from Mass Shootings* set the average shooter’s rates of fire for a semiautomatic handgun and semiautomatic “assault rifle” at an identical two rounds per second, with the expert shooter firing both weapons at three rounds per second.¹¹³ Using a Glock 19 semiautomatic handgun with a thirty-three-round magazine, the Tucson shooter fired thirty-three rounds in fifteen seconds, slightly faster than two rounds per second.¹¹⁴ In my own testing, I fired three rounds from a semiautomatic handgun in 0.93 seconds.¹¹⁵ Even non-semiautomatic handguns can be fired quickly. The shooter who attempted to assassinate President Reagan in March 1981 fired six shots in 1.7 seconds from a .22 caliber revolver, which is 3.5 rounds per second.¹¹⁶ These rates of fire are nearly identical to the AR-15.

Like the AR-15, the rate of fire for semiautomatic shotguns also depends on how fast the shooter can pull the trigger. Shotguns with gas-operated firing systems similar to the AR-15, such as the Benelli

112. Chuck Remsberg, *New Tests Show Deadly Accuracy & Startling Speed Even Inexperienced Shooters Can Achieve in Shooting Cops*, FORCE SCI. INST. (Feb. 23, 2007), <https://www.forcescience.org/2007/02/new-tests-show-deadly-accuracy-startling-speed-even-inexperienced-shooters-can-achieve-in-shooting-cops/>. The results include reaction time. *Id.*

113. KLAREVAS, *supra* note 92, at 211–12.

114. *Id.* at 209; see Press Release, Fed. Bureau of Investigation: Phx. Div., Jared Lee Loughner Sentenced in Arizona on Federal Charges in Tucson Shooting (Nov. 8, 2012), <https://archives.fbi.gov/archives/phoenix/press-releases/2012/jared-lee-loughner-sentenced-in-arizona-on-federal-charges-in-tucson-shooting>; David Nakamura et al., *Videos Show Details of Tucson Shooting*, WASHINGTON POST (Jan. 19, 2011, 12:00 AM), <http://www.washingtonpost.com/wp-dyn/content/article/2011/01/18/AR2011011801155.html>.

115. I fired at a single stationary target using a Sig Sauer P226 Legion 9mm SAO (single action only) handgun and PACT Club shot timer. The results include reaction time. Wallace, *supra* note 23, at 219.

116. JILL LEPORE, *THESE TRUTHS: A HISTORY OF THE UNITED STATES* 672 (2018).

M4, Mossberg 930, and Winchester SX3, can fire as fast or faster than the AR-15.¹¹⁷ For example, fast-shot expert Jerry Miculek fired twenty-three rounds from a Mossberg 930 shotgun in 3.73 seconds, which is about six rounds per second and nearly identical to his rate of fire with an AR-15.¹¹⁸ A shotgun's rate of fire will be much faster than the AR-15 if you count the multiple small, spherical projectiles it can fire with each pull of the trigger. A twelve-gauge shotgun loaded with a 2.75-inch No. 00 buckshot shell can fire eight to twelve pellets, each having a nominal diameter of .33 inches (.33 caliber).¹¹⁹ A twelve-gauge shotgun firing a three-inch shell with No. 4 buckshot can launch forty-one projectiles of .24 caliber size with a single trigger pull.¹²⁰ By comparison, typical ammunition for the AR-15 is .223 caliber (although elongated with greater mass). This means that with five trigger pulls in five seconds, a shotgun can fire as many as sixty .33 caliber projectiles or more than two hundred .24 caliber projectiles, while the AR-15 fires only five .223 caliber projectiles.

The rate of fire for many non-banned semiautomatic rifles also is nearly identical to the AR-15. As explained above, the AR-15's maximum effective rate of fire is forty-five rounds per minute. The popular semiautomatic Ruger Mini-14 rifle comes without a folding or telescoping stock or pistol grip, exempting it from typical "assault

117. See generally Gun News Daily, *Like Shotguns? You Have to Try Out These Semi-Automatic Beasts*, NAT'L INT.: THE BUZZ (Dec. 12, 2019), <https://nationalinterest.org/blog/buzz/shotguns-you-have-try-out-these-semi-automatic-beasts-103947> ("[Q]uick reloading and ejecting allows for the rapid-fire ability of [semiautomatic] shotguns").

118. Compare Jerry Miculek, *23 Rounds in 3.73 Seconds with a Mossberg 930 Shotgun*, YOUTUBE (May 13, 2013), https://www.youtube.com/watch?time_continue=108&v=N5QTFvnENRc&feature=emb_logo, with Jerry Miculek, *30 Caliber Magazine Clip in a Half Second! (With the World's Fastest Shooter, Jerry Miculek)*, YOUTUBE (Feb. 6, 2014), <https://www.youtube.com/watch?v=REdjjLBaiOs> (firing thirty rounds from an AR-15 in 5.3 seconds for an average of almost six rounds per second), and Jerry Miculek, *AR-15 5 Shots in 1 Second with Fastest Shooter Ever, Jerry Miculek (Shoot Fast!)*, YOUTUBE (June 20, 2013), https://www.youtube.com/watch?v=v3gf_5MR4tE (firing five rounds from an AR-15 in one second). Patrick Flanigan, known as the world's fastest shotgun shooter, fired twelve rounds from a semiautomatic Winchester SX3 in 1.44 seconds, which is over eight rounds per second. AccurateShooter, *Rapid-Fire Shotgun—World's Fastest*, YOUTUBE (Dec. 8, 2007), <https://www.youtube.com/watch?v=cebOI-NS5Kc>.

119. See Richard Mann, *Buckshot Basics*, NRA SHOOTING ILLUSTRATED (Jan. 31, 2012), <https://www.shootingillustrated.com/articles/2012/1/31/buckshot-basics/>.

120. See Buckshot 12 Gauge, FED., <https://www.federalpremium.com/shotshell/premium-slug-buckshot/vital-shok-buckshot/11-P158+4B.html> (last visited Sept. 26, 2020) (listing product specifications of buckshot for a twelve-gauge shotgun).

weapon” bans.¹²¹ It fires the same .223/5.56 round as the AR-15 and has an effective rate of fire of forty rounds per minute.¹²² Another example is the Soviet-era 7.62x39mm SKS semiautomatic rifle, which has a fixed ten-round magazine and is sold in the civilian market.¹²³ It has an effective (practical) rate of fire of forty to fifty rounds per minute.¹²⁴

Despite declaring the AR-15 far more lethal than other firearms, federal courts have compared the AR-15’s rate of fire only to machine guns and not to other semiautomatic firearms.¹²⁵ The above comparisons show that the AR-15 is no more dangerous in its rate of fire than modern semiautomatic handguns, shotguns, and non-banned rifles. The semiautomatic firing system—one round fired for each trigger pull with automatic loading of the next round—produces a fairly consistent rate of fire across all modern semiautomatic firearms. Contrary to widely-held belief, the AR-15 does not fire bullets much faster than other semiautomatic firearms.

3. Assessing the Lethal Effects of the AR-15’s Magazine Capacity

A related argument is that the AR-15 is exceptionally lethal because its capability to use “large capacity magazines” (those holding more than ten rounds) enables it to fire more rounds faster than other firearms. The AR-15 uses a standard thirty-round detachable magazine, with aftermarket sixty-round and one hundred-round magazines available in box and drum versions. *Kolbe* says that larger-capacity magazines enhance the AR-15’s lethality by enabling a shooter “to shoot multiple human targets very rapidly.”¹²⁶ *Heller II* emphasizes that such “assault weapons” with such magazines “result

121. Kyle Mizokami, *Meet the Ruger Mini-14 Rifle: The Most Underappreciated Gun on the Planet?*, NAT’L INT. (Feb. 26, 2019), <https://nationalinterest.org/blog/buzz/meet-ruger-mini-14-rifle-most-underappreciated-gun-planet-45607>.

122. *Id.*

123. Aaron Smith, *The Long History of the Gun Used in the GOP Baseball Attack*, CNN MONEY (June 16, 2017, 8:10 AM), <https://money.cnn.com/2017/06/15/news/sks-rifle-gop-baseball-field-attack/index.html>.

124. U.S. DEP’T OF THE ARMY, SKS RIFLE: SIMONOV TYPE 56, at 13 (1969). The SKS originally was manufactured in the Soviet Union in the 1940s and later versions were produced in China and Soviet bloc countries. *See id.* at 1–2.

125. *See, e.g., Heller v. District of Columbia (Heller II)*, 670 F.3d 1244, 1263 (D.C. Cir. 2011) (“[I]t is difficult to draw meaningful distinctions between the AR-15 and the M-16.” (citations omitted)).

126. *Kolbe v. Hogan*, 849 F.3d 114, 125 (4th Cir. 2017) (en banc) (internal quotation marks omitted) (citation omitted).

in more shots fired, persons wounded, and wounds per victim than do other gun attacks.”¹²⁷

The ability to accept larger-capacity magazines is not unique or specific to the AR-15. Most non-banned semiautomatic weapons—including constitutionally-protected handguns—also accept larger-capacity magazines.¹²⁸ Modern full-size semiautomatic handguns typically are sold with standard magazines holding fifteen to eighteen rounds, but they also accept magazines having even higher capacities, such as the Glock 9mm thirty-three-round factory magazine and aftermarket magazines holding up to one hundred rounds.¹²⁹

Larger-capacity magazines do not make the AR-15 fire any faster. Whether the shooter uses a ten-round, thirty-round, or one hundred-round magazine, the AR-15’s semiautomatic firing system still fires just one bullet for each trigger pull. Nor do larger-capacity magazines make bullets fired from an AR-15 strike more accurately or more powerfully than the same bullets fired from a ten-round magazine.¹³⁰ The weight and size of aftermarket sixty-round and one hundred-round magazines for the AR-15 actually can degrade the gun’s accuracy by making it more difficult to handle, and drum versions of

127. 670 F.3d at 1263 (internal quotation marks omitted) (quoting *KOPER ET AL.*, *supra* note 6, at 97).

128. See *Duncan v. Becerra*, 970 F.3d 1133, 1142 (9th Cir. 2020) (quoting *District of Columbia v. Heller*, 554 U.S. 570, 629 (2008)) (“LCMs [large-capacity magazines] are commonly used in many handguns, which the Supreme Court has recognized as the ‘quintessential self-defense weapon’”); *Kolbe*, 849 F.3d at 158 (Traxler, J., dissenting) (“[T]he [majority’s] suggestion that the ability to accept large-capacity magazines facilitates a firearm’s military usefulness applies to all semiautomatic weapons, including constitutionally-protected handguns, [because] any firearm that can hold a magazine can theoretically hold one of any size.”).

129. See *Glock Gen 4/5 Glock 17, 19, 26, 34 9mm 33-Round Factory Magazine*, GUNMAG WAREHOUSE, <https://gunmagwarehouse.com/glock-magazine-gen-4-glock-17-19-26-34-9mm-luger-33-round-polymer-black.html> (last visited Sept. 27, 2020). Aftermarket manufacturers sell forty-round, fifty-round, and even one hundred-round drum magazines for popular semiautomatic handguns. See, e.g., *KCI Glock 9mm 50-Round Drum Magazine*, GUNMAG WAREHOUSE, <https://gunmagwarehouse.com/kci-glock-9mm-50-round-drum-magazine.html> (last visited Sept. 27, 2020); *100 Round Drum Magazine 9MM*, GLOCKPARTS, <https://www.glockparts.com/custom/BET-GLOCK.htm> (last visited Oct. 1, 2020).

130. See Christopher S. Koper, *Assessing the Potential to Reduce Deaths and Injuries from Mass Shootings Through Restrictions on Assault Weapons and Other High-Capacity Semiautomatic Firearms*, 19 CRIMINOLOGY & PUB. POL’Y 147, 149 (2020) (noting that besides accepting larger-capacity magazines, “assault weapons” like the AR-15 “do not operate differently than other comparable semiautomatics, nor do they fire more lethal ammunition”).

such magazines are highly prone to jamming.¹³¹ These magazines can render the AR-15 *less* lethal. The Aurora shooter’s AR-15 with a one hundred-round drum jammed after firing sixty-five rounds, prompting the prosecutor to declare that “[h]ad the AR-15 not jammed, he would have killed more people.”¹³²

Both ban proponents and federal courts say that restricting magazine capacity to only ten rounds will force the shooter to make additional magazine changes, resulting in fewer shots fired and giving bystanders more opportunities to subdue the shooter or to escape the scene while the shooter is reloading.¹³³ They point to studies showing that larger-capacity magazines frequently are used in high-fatality mass public shootings.¹³⁴ This should not come as a surprise, given the ubiquity of such magazines. Larger-capacity magazines have long been sold both individually and as standard equipment on the most popular semiautomatic handguns and rifles.¹³⁵ Current estimates

131. See Matthew Larosiére, *Losing Count: The Empty Case for “High-Capacity” Magazine Restrictions*, CATO INST. (July 17, 2018), <https://www.cato.org/publications/legal-policy-bulletin/losing-count-empty-case-high-capacity-magazine-restrictions> (noting that “extremely high-capacity magazines, such as ‘drums’ with [one hundred] or [two hundred] rounds” are more likely to malfunction).

132. Wian et al., *supra* note 105 (quoting the prosecutor); see also TRIDATA DIV., SYS. PLAN. CORP., AURORA CENTURY 16 THEATER SHOOTING: AFTER ACTION REPORT FOR THE CITY OF AURORA 12–13 (2014) [hereinafter AURORA AFTER ACTION REPORT] (indicating that the shooter fired sixty-five rounds from the rifle until it jammed).

133. See, e.g., *Kolbe v. Hogan*, 849 F.3d 114, 127, 128 (4th Cir. 2017) (en banc) (explaining that large-capacity magazines “depriv[e] victims and law enforcement officers of opportunities to escape or overwhelm the shooters while they reload their weapons” and that “reducing the number of rounds that can be fired without reloading increases the odds that lives will be spared in a mass shooting”); *Large Capacity Magazines*, GIFFORDS L. CTR. TO PREVENT GUN VIOLENCE: HARDWARE & AMMUNITION, <https://lawcenter.giffords.org/gun-laws/policy-areas/hardware-ammunition/large-capacity-magazines/> (last visited Jan. 30, 2020) (“Because shooters with such magazines can fire at large numbers of people without taking the time to reload, those in the line of fire do not have a chance to escape, law enforcement does not have the chance to intervene, and the number of lives shattered by acts of gun violence increases dramatically.”).

134. See, e.g., *Kolbe*, 849 F.3d at 126–27 (citing unnamed studies). For the most recent studies, see generally Louis Klarevas et al., *The Effect of Large-Capacity Magazine Bans on High-Fatality Mass Shootings, 1990–2017*, 109 AM. J. PUB. HEALTH 1754 (2019); Koper, *supra* note 130; Daniel Webster et al., *Evidence Concerning the Regulation of Firearms Design, Sale, and Carrying on Fatal Mass Shootings in the United States*, 19 CRIMINOLOGY & PUB. POL’Y 171 (2020).

135. See David Kopel, *Magazines over 10 Rounds Were Well-Known to the Founders*, REASON: THE VOLOKH CONSPIRACY (Feb. 11, 2020, 7:16 PM), <https://reason.com/2020/02/11/magazines-over-10-rounds-were-well-known-to-the-founders/> (“[G]uns with ammunition capacity greater than [ten] rounds have existed

suggest that there are more than 100 million magazines holding more than ten rounds in circulation in the United States.¹³⁶ Thus, associating larger-capacity magazines with higher fatality rates may be evidence “only of popularity, not of lethality.”¹³⁷

Studies measuring larger-capacity magazine use in high-fatality mass public shootings ask the wrong question. What matters is not whether larger-capacity magazines were used in such shootings but whether smaller magazines would have reduced the number of casualties. If a shooter uses a thirty-round magazine, fires ten rounds, and kills eight people, a smaller magazine would not have changed the outcome. If potential victims are not in a position to overpower or escape the shooter when he reloads, a smaller magazine would not have changed the outcome. If alternate weapons are readily available to the shooter, again, smaller magazines would not have changed the outcome. Simply counting incidents and casualties overestimates the effects of magazine size on mass public shootings.

To determine the effects of magazine size, researchers must consider a wide array of variables, such as the shooter’s determination to kill, how long the shooting lasted, the shooter’s rate of fire, the total number of rounds fired, how often and how fast the shooter changed magazines, how many magazines or alternate weapons were readily available to the shooter, and the location, number, density, and posture of the victims. In the only study to date that attempts to analyze some of these variables, Gary Kleck presents evidence that larger-capacity magazines do not produce more lethal outcomes in

since the sixteenth century, were well-known to the Founders (including the Continental Congress), and were mass market consumer items by the time of the Fourteenth Amendment.”).

136. See *Duncan v. Becerra*, 970 F.3d 1133, 1142 (9th Cir. 2020) (noting that half of the 230 million magazines in circulation in America hold more than ten rounds); Griff Witte, *As Mass Shootings Rise, Experts Say High-Capacity Magazines Should Be the Focus*, WASHINGTON POST (Aug. 18, 2019, 6:23 PM), https://www.washingtonpost.com/national/as-mass-shootings-rise-experts-say-high-capacity-magazines-should-be-the-focus/2019/08/18/d016fa66-bfa3-11e9-a5c6-1e74f7ec4a93_story.html (noting the NRA estimates “that more than 250 million magazines with a capacity of [eleven] rounds or greater are in circulation. . . . [with] 100 million hav[ing] a capacity of at least [thirty] rounds”). Because popular semiautomatic handguns and long guns are not sold with standard magazine capacity exceeding thirty rounds, the vast majority of these magazines hold thirty rounds or less. Thus, larger forty to one hundred round magazines compose only a limited portion of the magazines in circulation.

137. Larosiére, *supra* note 131.

mass shootings.¹³⁸ Until more data are collected and analyzed, studies examining the frequency of larger-capacity magazine use in high-fatality mass shootings may make good headlines but reveal little about the actual effects of magazine capacity on firearm lethality.¹³⁹

Larger-capacity magazines do allow a shooter to fire more shots before pausing to reload. If a shooter fires *continuously*—round after round without pause—a larger-capacity magazine will allow him to fire more shots than a smaller magazine, thereby increasing the firearm’s lethality. The Dayton nightclub shooter fired forty-one shots in thirty seconds with an AR-15 equipped with a one hundred-round drum magazine before being shot by police.¹⁴⁰ Using a Glock 19 semiautomatic handgun with a thirty-three-round magazine, the Tucson shooter fired thirty-three rounds in fifteen seconds, after which he was tackled by bystanders when his handgun jammed either during or after reloading.¹⁴¹ In both of these tragic shootings, a smaller magazine almost certainly would have meant fewer rounds fired—and likely fewer casualties—before the shooter was stopped. But, as these examples illustrate, larger-capacity magazines do not make the AR-15 “exceptional” or “far more lethal” in its rate of fire; rather, they show that the AR-15 with a larger-capacity magazine is no more lethal in its rate of fire than a semiautomatic handgun with a larger-capacity magazine.

Mass public shootings rarely involve continuous firing without interruption. The vast majority take place over several minutes, during which the shooter repeatedly pauses firing.¹⁴² Because changing a magazine takes only a few seconds,¹⁴³ pauses due to reloading will not take any longer than pauses between shots when not reloading. Thus, it is unlikely that reloading will significantly slow the shooter and reduce the total rounds fired.¹⁴⁴ The Sutherland Springs church shooter changed magazines fifteen times, firing at

138. See Gary Kleck, *Large-Capacity Magazines and the Casualty Counts in Mass Shootings: The Plausibility of Linkages*, 17 JUST. RES. & POL’Y 28, 44 (2016).

139. A significant problem with many of these studies is that they fail to disaggregate “assault weapons” and large-capacity magazines, thus inflating the figures for both. See Wallace, *supra* note 23, at 235.

140. Yan et al., *supra* note 104.

141. KLAREVAS, *supra* note 92, at 209; Press Release, Fed. Bureau of Investigation: Phx. Div., *supra* note 114.

142. See Gary Kleck, *Mass Shootings in Schools: The Worst Possible Case for Gun Control*, 52 AM. BEHAV. SCIENTIST 1447, 1451 (2009) (“[C]lose examination of mass shootings also indicates that killers typically take their time, firing deliberately at individual victims over fairly long periods of time.”).

143. See Wallace, *supra* note 23, at 236.

144. *Id.* at 238.

least 450 rounds in seven minutes;¹⁴⁵ the Parkland school shooter fired more than 150 rounds in 5.5 minutes, changing magazines five times;¹⁴⁶ the Newtown shooter fired 156 rounds in five minutes, emptying three thirty-round magazines and replacing two other thirty-round magazines while they still contained ammunition;¹⁴⁷ the Fort Hood shooter used a semiautomatic handgun with twenty-round and thirty-round magazines, firing 214 rounds in ten minutes.¹⁴⁸ In none of these incidents did reloading so slow the shooters that potential victims were able to subdue the shooter or escape.¹⁴⁹

Smaller magazines made little or no difference in the number of casualties in two tragic high-fatality mass public shootings. The Virginia Tech shooter fired 174 rounds from two handguns in ten to twelve minutes while walking back and forth among classrooms.¹⁵⁰

145. John Bridges et al., *Hundreds of Shell Casings, 15 Empty Magazines Found at Church*, STATESMAN (Sept. 22, 2018, 3:39 AM), <https://www.statesman.com/news/20171107/hundreds-of-shell-casings-15-empty-magazines-found-at-church>; Nomaan Merchant & Paul J. Weber, *Texas Church Shooter Devin Kelley Fired at Least 450 Rounds*, GLOB. NEWS (Nov. 6, 2017, 2:29 PM), <https://globalnews.ca/news/3846016/texas-church-shooter-devin-kelley-assault-animal-cruelty/>.

146. MARJORY STONEMAN DOUGLAS HIGH SCH. PUB. SAFETY COMM'N, INITIAL REPORT SUBMITTED TO THE GOVERNOR, SPEAKER OF THE HOUSE OF REPRESENTATIVES AND SENATE PRESIDENT 25–34, 91, 108 (2019); Evan Perez, *Florida School Shooter Could Have Fired Many More Bullets*, CNN (Feb. 27, 2018, 6:59 PM), <https://www.cnn.com/2018/02/27/us/florida-school-shooter-ammunition-left/index.html>.

147. OFF. OF THE STATE'S ATT'Y JUD. DIST. OF DANBURY, REPORT OF THE STATE'S ATTORNEY FOR THE JUDICIAL DISTRICT OF DANBURY ON THE SHOOTINGS AT SANDY HOOK ELEMENTARY SCHOOL AND 36 YOGANANDA STREET, NEWTOWN, CONNECTICUT ON DECEMBER 14, 2012, at 17–22 (2013). The Newtown shooter emptied three thirty-round magazines but did not wait until two other thirty-round magazines were empty to change them. *Id.* at 21–22.

148. Rick Jervis, *Fort Hood Massacre Trial: Hasan Goes on the Defense*, USA TODAY (July 8, 2013, 6:33 PM), <https://www.usatoday.com/story/news/nation/2013/07/08/fort-hood-shooting-trial-hasan-court-martial/2427095/>; Charley Keyes, *Fort Hood Witness Says He Feared There Were More Gunmen*, CNN (Oct. 20, 2010, 6:10 PM), <http://www.cnn.com/2010/CRIME/10/20/texas.fort.hood.shootings/index.html?hpt=T1>.

149. The Fourth Circuit in *Kolbe* twice claimed without any supporting citation that nine children ran from a classroom during the Newtown shooting when the gunman paused to change a thirty-round magazine. *Kolbe v. Hogan*, 849 F.3d 114, 120, 128 (4th Cir. 2017) (en banc). While initially reported in a few media accounts, this fact was never confirmed and does not appear in the official report on the shooting. Other news articles indicated that the shooter's gun jammed. *See* Wallace, *supra* note 23, at 239. Clearing a jam causes the shooter to pause longer because it requires more steps than simply removing and replacing the magazine.

150. *See* TRIDATA DIV., MASS SHOOTINGS AT VIRGINIA TECH: ADDENDUM TO THE REPORT OF THE REVIEW PANEL 74, 92 (2009) (discussing the Virginia Tech shooting).

During this period, he changed magazines seventeen times, including several ten-round magazines.¹⁵¹ The shooting review panel considered whether a ban on larger-capacity magazines might have resulted in fewer casualties, but concluded that “[ten-round] magazines . . . would have not made much difference in the incident.”¹⁵² At Columbine, one shooter used a 9mm TEC-DC9 semiautomatic pistol with one twenty-eight-round, one thirty-two-round, and one fifty-two-round magazine to fire a total of fifty-five rounds.¹⁵³ The other shooter used thirteen ten-round magazines in a 9mm Hi-Point 995 semiautomatic carbine to fire ninety-six rounds during the same period of time.¹⁵⁴ What mattered more in both of these shootings was number of magazines readily available to the shooters, not their capacity.

While there are good reasons to question both the constitutionality and effectiveness of magazine size restrictions, such issues are beyond the scope of this Article.¹⁵⁵ My point is that even if the ability to accept larger-magazines arguably makes the AR-15 more lethal, it does not make the AR-15 lethal “far beyond” other non-banned firearms because many of those firearms also accept larger-capacity magazines. Moreover, the AR-15 does not require standard thirty-round magazines to function, so any enhanced lethal effects of larger-capacity magazines can be addressed by regulating magazine size.¹⁵⁶ The more narrowly-tailored solution under heightened judicial scrutiny is to ban the magazine rather than the firearm.

The AR-15 is no more dangerous in its rate of fire than other modern semiautomatic handguns, shotguns, and non-banned rifles.

151. *Id.*

152. *Id.* at 74.

153. Carey Vanderborg, *Columbine Shooting Anniversary: Five Other Deadly School Shootings*, INT’L BUS. TIMES (Apr. 20, 2012, 11:14 AM), <https://www.ibtimes.com/columbine-shooting-anniversary-five-other-deadly-school-shootings-555158>; *The Point of No Return*, COAL. TO STOP GUN VIOLENCE, <https://www.csgv.org/point-return/> (last visited Feb. 11, 2020). The two shooters also fired a combined thirty-seven shotgun rounds.

154. Vanderborg, *supra* note 153.

155. See generally *Duncan v. Becerra*, 970 F.3d 1133, 1169 (9th Cir. 2020) (striking down a California state law barring citizens from owning large capacity magazines because it imposed a substantial burden on the right to bear arms in self-defense); David B. Kopel, *The History of Firearm Magazines and Magazine Prohibitions*, 78 ALB. L. REV. 849 (2014) (analyzing the constitutionality of magazine prohibitions in light of precedents that rely on history and tradition in judging Second Amendment cases); Larosiére, *supra* note 131 (“[T]here is little evidence that high-capacity magazine restrictions have any positive effects on public safety.”).

156. See Koper, *supra* note 130, at 149 (noting that without larger-capacity magazines, “AW-type firearms do not operate differently than other comparable semiautomatics, nor do they fire more lethal ammunition”).

Its semiautomatic firing system produces a rate of fire comparable to all modern semiautomatic firearms, including constitutionally-protected semiautomatic handguns. Based on the rate of fire metric, the AR-15 is not exceptionally lethal.

B. The AR-15's Accuracy

There is no discussion of the AR-15's accuracy as enhancing its lethality in *Heller II*, *Friedman*, or *Worman* and only passing reference to accuracy in *NYSRPA* and *Kolbe*.¹⁵⁷ Instead, federal courts have focused on the AR-15's rate of fire and terminal effects to support their claims that the AR-15 is exceptionally lethal. This omission is understandable given the fact that mass public shootings typically occur at shorter distances against unarmed and unsuspecting victims where precise accuracy is not necessary to inflict casualties.

The AR-15 is easier to shoot more accurately than a handgun—but then so are *all* shoulder-fired long guns. Their size and weight provides greater stability, resulting in better accuracy when aiming and managing recoil. The long gun has three points of support—the buttstock is pressed against the shoulder, the dominant arm grips the stock or pistol grip, and the support arm holds the forend. The handgun has only two points of support—both arms hold the handgun in one place (around the grip) in front of and away from the body. The long gun also has a longer sight radius (distance between front and rear sight) than a handgun, which is more forgiving of sight alignment errors.

When compared to other long guns, the AR-15 is not exceptionally lethal in its accuracy; in fact, there are non-banned long guns widely sold in the civilian market that are more accurate than AR-15. Rifle accuracy typically is measured in MOA (Minutes of Angle), which refers to the capability to fire a certain-sized grouping of shots at a particular distance.¹⁵⁸ MOA accuracy is best measured when shooting from a stable position (e.g., prone) with the rifle supported by a bipod

157. See *Kolbe v. Hogan*, 849 F.3d 114, 136 (4th Cir. 2017) (en banc) (stating that the semiautomatic fire of an AR-15 is more accurate and lethal than the automatic fire of an M16); *N.Y. State Rifle & Pistol Ass'n v. Cuomo (NYSRPA)*, 804 F.3d 242, 262 (2d Cir. 2015) (asserting that features that make a firearm more accurate also make it more deadly).

158. See Ryan Cleckner, *What is MOA? Understanding and Using Minute of Angle*, GUN U. (Feb. 10, 2019), <https://gununiversity.com/what-is-moa-understanding-and-using-minute-of-angle/>.

or other shooting rest. A one-MOA rifle is capable of consistently firing three to five shot groupings no more than one inch apart at a distance of one hundred yards.¹⁵⁹ A one-MOA rifle can fire a two-inch group at two hundred yards, a three-inch group at three hundred yards, and so on.¹⁶⁰ Lower-priced AR-15s (under \$1,000) typically shoot around two to three MOA (two to three inch groups at one hundred yards) with factory ammunition while high-end AR-15s (over \$1,500) often shoot one MOA or sub-MOA (between 0.75 and one inch groups at one hundred yards).

A standard AR-15 generally is more accurate than the AK-47, another popular “assault weapon,”¹⁶¹ but less accurate than bolt-action hunting and precision rifles, most of which shoot sub-MOA with some shooting sub-one-half-MOA.¹⁶² Even with precision semiautomatic rifles, bolt-action rifles normally are more accurate, especially at longer distances.¹⁶³ At very short ranges, shotguns can more easily hit targets without the need for precise aim due to their spread fire pattern. At ten yards, the nine .33 caliber round pellets in 00 buckshot spread about 2–2.5 inches; at twenty yards, the spread pattern is seven to nine inches.¹⁶⁴ This capability to strike at short-ranges is one reason why some people choose a shotgun for home defense.

The AR-15’s smaller rounds, straight-line design, and firing mechanism reduce recoil, which allows better second-shot accuracy than a shotgun or hunting rifle when firing rounds in quick succession. The benefit of increased second-shot accuracy depends on shooter skill, rate of fire, and target distance, but it is unlikely to turn average shooters into marksmen. Most firearms are mechanically more accurate than an average shooter can fire them. This especially is true when the shooter is moving and firing unsupported at targets

159. One MOA at one hundred yards actually is 1.047 inches, but it is rounded off to one inch. *See id.*

160. *See id.*

161. *See* Nick Irving, *AK-47 Accuracy and Reliability*, SOFREP (July 19, 2018), <https://sofrep.com/gear/ak-47-accuracy-and-reliability/>.

162. *See* John B. Snow, *The 10 Most Accurate Factory Hunting Rifles We’ve Ever Tested*, FIELD & STREAM (Sept. 17, 2019), <https://www.fieldandstream.com/10-most-accurate-factory-hunting-rifles-weve-ever-tested/>. I have shot less than half-inch groups with my precision bolt-action rifle at one hundred yards.

163. *See* Nick Irving, *Sniper’s Choice: Bolt-Action vs. Semi-Auto Precision Rifles*, SOFREP (Jan. 1, 2020), <https://sofrep.com/gear/snipers-choice-bolt-action-vs-semi-auto-precision-rifles/>.

164. *See* Kevin Davis, *Buckshot Myth Busting: How Today’s 00 Buck Loads Fare Downrange*, TACTICAL LIFE (Mar. 21, 2018), <https://www.tactical-life.com/gear/ammo/00-buckshot-ammo-test/>.

short distances away as typically occurs in mass public shootings. While the AR-15 is accurate, there is no evidence that its accuracy far exceeds other firearms.¹⁶⁵

C. The AR-15's Terminal Ballistics

Courts upholding “assault weapon” bans also assume the AR-15 is exceptionally lethal because it causes more devastating wounds than other firearms. The First, Second, and Fourth Circuits have declared that the AR-15 and other banned weapons have “a capability for lethality—more wounds, more serious, in more victims—far beyond that of other firearms in general, including other semiautomatic guns.”¹⁶⁶ More wounds in more victims is a function of the AR-15’s rate of fire, about which judicial claims are greatly exaggerated, as shown above. More serious wounds are a function of the AR-15’s terminal ballistics, which studies the behavior and effects of a firearm’s projectile when it strikes a target. The following examines the terminal performance of the AR-15’s standard .223/5.56 round and compares it with other handgun, rifle, and shotgun rounds to determine whether the AR-15 is exceptionally lethal.

1. Measuring Bullet Over-penetration

Two circuits have specified that one reason “assault weapons” are more deadly than other firearms is that their bullets can penetrate walls and endanger people on the other side. The Fourth Circuit in *Kolbe* twice emphasized that the banned weapons “pose a heightened risk to civilians in that rounds from assault weapons have the ability to easily penetrate most materials used in standard home

165. See Irving, *supra* note 163 (noting that military snipers opt for bolt-action rifles when solely looking for accuracy). Accurate firearms are more dangerous for the shooter’s target but less dangerous for innocent bystanders. See Friedman v. City of Highland Park, 784 F.3d 406, 409 (7th Cir. 2015). It would be odd to ban accurate firearms while allowing possession and use of inaccurate firearms.

166. Worman v. Healey, 922 F.3d 26, 31 (1st Cir. 2019) (internal quotation marks omitted) (quoting H.R. REP. NO. 103-489, at 19–20 (1994)); Kolbe v. Hogan, 849 F.3d 114, 125, 137, 144 (4th Cir. 2017) (en banc) (same); N.Y. State Rifle & Pistol Ass’n v. Cuomo (*NYSRPA*), 804 F.3d 242, 262 (2d Cir. 2015) (same).

construction, car doors, and similar materials.”¹⁶⁷ Citing *Kolbe*, the First Circuit in *Worman* declared that “unlike the use of handguns[,] the use of semiautomatic assault weapons implicates the safety of the public at large. After all, such weapons can fire through walls, risking the lives of those in nearby apartments or on the street.”¹⁶⁸ What *Kolbe* implies, *Worman* makes explicit: “assault weapon” bullets penetrate walls, but handgun bullets do not.

Nearly all handgun, rifle, and shotgun rounds will pass through walls.¹⁶⁹ FBI testing indicates that to be reliably effective, bullets must penetrate soft body tissue twelve to eighteen inches, a range necessary to reach and disrupt a vital organ in a human target.¹⁷⁰ This penetration capability also means that bullets will penetrate walls if the shooter misses the target. Contrary to *Kolbe* and *Worman*, handgun rounds will penetrate several layers of sheetrock as well as exterior house walls.¹⁷¹ The difference between handgun and rifle rounds is how they behave when passing through walls. A pistol round typically remains relatively stable, while the AR-15’s longer and thinner profile .223/5.56-caliber round is likely to fragment or to lose

167. 849 F.3d at 127, J.A. 279 (internal quotation marks omitted) (quoting a declaration of Henry Stawinski, a deputy police chief); *id.* at 139. Stawinski subsequently admitted that he had not been trained in the use of an AR-15 or other banned “assault weapons” and that he had fired an AR-15 on only one occasion. *Id.* at J.A. 2487–88.

168. 922 F.3d at 37 (citation omitted) (citing *Kolbe*, 849 F.3d at 127).

169. For a high-speed video demonstration of AR-15, handgun, and shotgun rounds fired through sheetrock, see Beck’s Armory, *5.56, 12 Gauge, and 9mm vs Drywall in*

Slow Motion, YOUTUBE (Jan. 17, 2015), <https://www.youtube.com/watch?v=AXOIQgfvVIE>. Both handgun and shotgun rounds penetrated fourteen layers of sheetrock, while a small fragment of the AR-15 round penetrated fifteen layers. For additional range testing of AR-15, handgun, and shotgun rounds, see *The Box O’Truth #1—The Original Box O’Truth*, <https://www.theboxotruth.com/the-box-o-truth-1-the-original-box-o-truth/> (last visited Feb. 17, 2020), and *The Box O’Truth #14—Rifles, Shotguns, and Walls*, <https://www.theboxotruth.com/the-box-o-truth-14-rifles-shotguns-and-walls/> (last visited Feb. 17, 2020).

170. See Mike Callahan, *Why Bullet Size Matters in Officer-Involved Shootings*, POLICEONE.COM (Aug. 2, 2017), <https://www.policeone.com/police-products/firearms/accessories/ammunition/articles/why-bullet-size-matters-in-officer-involved-shootings-Ff0sxVITdSX8iAn7/>.

171. See R.K. Campbell, *Handgun Bullets: How Do They Penetrate in Home Materials?*, GUNTESTS (Mar. 19, 2020), <https://www.gun-tests.com/ammo/handgun-bullets-how-do-they-penetrate-in-home-materials-4/> (testing both wallboard and pine board penetration with various handgun rounds). See generally R.W. SCHEIFKE, CANADIAN POLICE RSCH. CTR., PENETRATION OF EXTERIOR HOUSE WALLS BY MODERN POLICE AMMUNITION (1997) (Can.) (showing that all tested handgun rounds except one passed through stucco, vinyl, and cedar siding with sufficient velocity to wound).

stability and tumble end-over-end (keyhole), bleeding energy rapidly due to the larger surface area hitting the drywall.¹⁷² Generally, .223/5.56 bullets penetrate *less* through building materials than common handgun and shotgun rounds.¹⁷³ This is one reason law enforcement officers often use the select-fire M4 or semiautomatic AR-15 for raiding buildings and hostage situations, especially in urban areas.¹⁷⁴ Some bullet designs can reduce penetration through walls, but the best way to minimize the chances of hurting innocent persons is to make accurate hits on the target. As handguns also require more skill to fire accurately than rifles, they typically pose a greater risk to public safety from bullet over-penetration than the AR-15.¹⁷⁵

Kolbe also emphasizes that rounds from “assault weapons” such as the AR-15 “easily pass through the soft body armor worn by most law enforcement officers.”¹⁷⁶ But this is true of *all* rifles.¹⁷⁷ Soft body

172. See Tom Hale, *Is an AR-15 Appropriate for Home Defense? Part One: Penetration Issues*, OUTDOOR HUB (Nov. 4, 2013), <https://www.outdoorhub.com/stories/2013/11/04/ar-15-appropriate-home-defense-part-one-penetration-issues/>; [Study] *Home Defense Overpenetration: Shotgun, Handgun, Rifle*, PEW PEW TACTICAL (Jan. 12, 2020), <https://www.pewpewtactical.com/home-defense-overpenetration/#toc15>.

173. See GABRIEL SUAREZ, *THE TACTICAL RIFLE: THE PRECISION TOOL FOR URBAN POLICE OPERATIONS* 38 (1999) (explaining that walls are more easily penetrated by pistol calibers, that concerns about .223/5.56 over-penetration and resulting danger to the public have been greatly exaggerated, and that such rounds are safer than pistol bullets because they tend to fragment when shot through a wall, reducing penetration); Gary K. Roberts, *The Wounding Effects of 5.56MM/.223 Law Enforcement General Purpose Shoulder Fired Carbines Compared with 12 GA. Shotguns and Pistol Caliber Weapons Using 10% Ordnance Gelatin as a Tissue Simulant*, *WOUND BALLISTICS REV.*, 1998, at 16, 23–24 (describing testing results showing that .223/5.56 bullets fired through an interior wall had “significantly less penetration” than popular handgun and twelve gauge rounds and affirming that “stray 5.56mm/.223 bullets seem to offer a reduced risk of injuring innocent bystanders . . . where bullets miss their intended targets and enter or exit structures”).

174. See *Kolbe v. Hogan*, 849 F.3d 114, J.A. 2168–68 (4th Cir. 2017) (declaration of Boone). Boone is a firearms and ballistics expert, firearms trainer, and former FBI agent who directed the FBI Ballistic Research Facility for fifteen years. When confronting outdoor threats, officers typically use “barrier blind” rounds that can penetrate vehicle sheet metal and glass. See Jeff Chudwin, *The Ammunition Factor*, *LAW OFFICER* (Jan. 18, 2017), <https://www.lawofficer.com/the-ammunition-factor>.

175. See David Schoenberg, *Top Gun . . . for Home Defense*, *DAILY CALLER* (Mar. 14, 2012, 2:08 PM), <https://dailycaller.com/2012/03/14/top-gun...for-home-defense/>.

176. *Kolbe*, 849 F.3d at 127 (internal quotation marks omitted).

177. See U.S. DEPT OF JUST., *SELECTION AND APPLICATION GUIDE TO PERSONAL BODY ARMOR 15* (2001) (noting that “body armor designed to defeat rifle fire” must have “semirigid or rigid construction”).

armor (Levels I-III) only stop rounds from handguns and shotguns; rifle rounds require steel, ceramic, or composite hard plates (Levels III-IV).¹⁷⁸ The Fourth Circuit’s point might explain one way rifles are more dangerous than handguns, but it does not explain why the AR-15 is itself exceptionally lethal “far beyond” other rifles.¹⁷⁹

Both *Kolbe* and *Worman* embrace the false narrative that the AR-15 is more lethal than other firearms because it poses a greater risk of bullet over-penetration. Experts on both sides pointed out to the Fourth Circuit in *Kolbe* that all rifles penetrate soft armor,¹⁸⁰ and plaintiffs’ experts emphasized that all firearms penetrate building materials,¹⁸¹ but the court nevertheless concluded that the banned weapons “pose *heightened* risks to innocent civilians and law enforcement officers—certainly because of the capability to penetrate building materials and soft body armor.”¹⁸² Heightened compared to what? Certainly not the risks posed by most other firearms in penetrating building materials as handgun and shotgun rounds typically penetrate as much or more than AR-15 rounds. And certainly not the risks posed by other rifles in penetrating soft body armor because the AR-15’s capability to penetrate such armor is a feature common to all rifles and not exclusive to the AR-15 or other “assault weapons.” Bullet over-penetration is not a reason to conclude that the AR-15 is exceptionally lethal.

2. Measuring Wound Severity

Wound ballistics is a subset of terminal ballistics and studies the effects of a penetrating projectile on living tissue. Dr. Martin Fackler, former military trauma surgeon and director of the Army’s Wound Ballistics Laboratory, is the most widely-recognized modern expert on

178. See JUST. TECH. INFO. CTR., UNDERSTANDING NIJ 0101.06 ARMOR PROTECTION LEVELS CENT (2016). See generally *Body Armor Performance Standards*, NAT’L INST. OF JUST. (Feb. 22, 2018), <https://nij.ojp.gov/topics/articles/body-armor-performance-standards> (describing the National Institute of Justice’s general requirements for body armor worn by law enforcement and corrections officers).

179. *Kolbe*, 849 F.3d at 125, 137, 144 (internal quotation marks omitted).

180. *Id.* at 127 (quoting *id.* at J.A. 279 (noting the state’s expert declared that “rounds from many handguns also can penetrate through such materials”)); *id.* at 129, 139 (describing plaintiffs’ evidence).

181. *Id.* at 129, 139.

182. *Id.* at 139 (emphasis added).

the subject.¹⁸³ He observed in 1987 that “[p]robably no scientific field contains more misinformation than wound ballistics.”¹⁸⁴ Research by Dr. Fackler and others helped correct these misconceptions.¹⁸⁵ Despite this research, erroneous beliefs about wound ballistics persist, even among medical doctors who treat gunshot wounds.¹⁸⁶ “Assault weapon” ban proponents—including physician advocates—continue to spread multiple myths about the wounding effects of such firearms, and some of these myths have made their way into federal court decisions upholding “assault weapon” bans.

Kolbe, for example, misleadingly asserts that military field testing from Vietnam in 1962 reported that high-velocity projectiles from the AR-15 caused “[a]mputations of limbs, massive body wounds, and decapitations.”¹⁸⁷ This AR-15 was the selective-fire prototype for the military M16, not today’s semiautomatic-only civilian AR-15. The testing was conducted as part of Project AGILE, part of a

183. See David B. Powers & O. Bailey Robertson, *Ten Common Myths of Ballistic Injuries*, 17 ORAL MAXILLOFACIAL SURGERY CLINICS N. AM. 251, 251 (2005) (“Any investigation of ballistic injuries after 1970 is in some way based on the work of Martin Fackler, from the International Wound Ballistics Association, who is generally considered to have brought true scientific, critical evaluation to the study of ballistics.”); W. Hays Parks, *Father of Modern Wound Ballistics*, SMALL ARMS DEF. J. (Aug. 11, 2017), <http://www.sadefensejournal.com/wp/father-of-modern-wound-ballistics/>.

184. MARTIN L. FACKLER, WHAT’S WRONG WITH THE WOUND BALLISTICS LITERATURE, AND WHY I (1987).

185. See, e.g., MARTIN L. FACKLER, WOUND BALLISTICS RESEARCH OF THE PAST TWENTY YEARS: A GIANT STEP BACKWARDS 1 (1990); Martin L. Fackler, *Gunshot Wound Review*, 28 ANNALS EMERGENCY MED. 194, 195 (1996) [hereinafter Fackler, *Gunshot Wound Review*]; Martin L. Fackler, *Wound Ballistics: A Review of Common Misconceptions*, 259 JAMA 2730, 2730 (1988) [hereinafter Fackler, *Common Misconceptions*].

186. See Peter M. Rhee et al., *Gunshot Wounds: A Review of Ballistics, Bullets, Weapons, and Myths*, 80 J. TRAUMA ACUTE CARE SURGERY 853, 853–55 (2016) (“[M]any health care providers’ understanding of ballistics, bullets, and guns . . . are falsely propagated because of media, uneducated beliefs, and urban legends” (footnotes omitted)). See generally Stephen C. Hafertepen et al., *Myths and Misinformation About Gunshot Wounds May Adversely Affect Proper Treatment*, 39 WORLD J. SURGERY 1840 (2015) (identifying several myths about wound ballistics appearing in current trauma literature and prevalent among 115 clinicians who provided both surgical and emergency medical care for a large number of gunshot wounds in three California urban trauma centers).

187. *Kolbe v. Hogan*, 849 F.3d 114, 124, J.A. 968 (4th Cir. 2017) (en banc) (internal quotation marks omitted) (quoting KEVIN DOCKERY, SPECIAL WARFARE: SPECIAL WEAPONS: THE ARMS & EQUIPMENT OF THE UDT AND SEALS FROM 1943 TO THE PRESENT 131 (2009)).

counterinsurgency research program in southeast Asia initiated by the Defense Department’s Advanced Research Projects Administration (ARPA).¹⁸⁸ At the time, the military was considering whether to replace the M14 with the AR-15 (later renamed the M16) as its primary combat rifle.¹⁸⁹ Project AGILE supplied AR-15 selective-fire rifles to South Vietnamese combat troops for field trials to determine whether the AR-15 would perform satisfactorily in combat.¹⁹⁰ The subsequent report included claims of massive injuries from the AR-15’s 5.56mm round, including two amputations and a decapitation—types of injuries “rarely observed from rifle bullets.”¹⁹¹

The claims of massive wounding, amputations, and decapitations in the Project AGILE report were never substantiated.¹⁹² The military subsequently ordered worldwide testing of the AR-15 and M14, but these trials eventually broke down amid cross-accusations of bias and collusion from proponents of each rifle.¹⁹³ Nevertheless, the Army’s Wound Ballistic Laboratory at Edgewood Arsenal tested the lethality of the AR-15 in gelatin, animals, and cadavers but could not duplicate the “theatrically grotesque wounds” reported by Project AGILE.¹⁹⁴ “No matter what they did,” writes C.J. Chivers, who extensively researched the testing, “they were unable to reproduce the effects that the participants in Project AGILE claimed to have seen.”¹⁹⁵ Testing included hollow-point rounds like those used by civilians, but “even the hollow-points failed to duplicate anything like the spectacular effects recorded by the Vietnamese unit commanders and their American advisors, which had subsequently been taken as fact and much used in the . . . campaign to sell the AR-15.”¹⁹⁶ The Wound Ballistic Laboratory’s lethality study was kept secret for more than

188. See *M16 Rifle*, DEF. ADVANCED RSCH. PROJECTS AGENCY, <https://www.darpa.mil/about-us/timeline/agile-and-m16> (last visited Feb. 24, 2020).

189. *Id.*

190. *Id.*

191. C.J. CHIVERS, *THE GUN* 283 (2010) (“In order to accept these descriptions at face value, one would have to believe that in a small sampling of injuries the AR-15 had caused two traumatic amputations—a type of injury rarely observed from rifle bullets. But such coolheaded skepticism did not work its way into the report. A sales pitch was gathering momentum: The AR-15 was the most lethal rifle the world had known.”).

192. See *id.* at 288.

193. See *id.* at 283–90; R. BLAKE STEVENS & EDWARD C. EZELL, *THE BLACK RIFLE: M16 RETROSPECTIVE* 110–16 (2004).

194. CHIVERS, *supra* note 191, at 283–88; STEVENS & EZELL, *supra* note 193, at 116.

195. CHIVERS, *supra* note 191, at 288.

196. STEVENS & EZELL, *supra* note 193, at 116.

four decades, with the result that “at the most important time, during the early and mid-1960s, the Project AGILE report, with its suspicious observations and false conclusions, remained uncontested. The AR-15 continued to rise, boosted by a reputation for lethality and reliability that it did not deserve.”¹⁹⁷ *Kolbe* omits these facts, leaving the impression that civilian AR-15s today produce the same gruesome and horrific wounds reported by Project AGILE.

Worman has the most extensive discussion of wound severity. It quotes from the affidavit of Dr. Christopher Colwell, a “seasoned trauma surgeon” (actually an emergency room doctor, not a surgeon),¹⁹⁸ who says that “assault weapon” injuries “tend to cause far greater damage to the muscles, bones, soft tissue, and vital organs.”¹⁹⁹ *Worman* then cites two media articles that “substantiate the extreme damage such weapons are prone to cause.”²⁰⁰ One article from the *New York Times* quotes a doctor who says “[t]he tissue destruction is almost unimaginable. Bones are exploded, soft tissue is absolutely destroyed. The injuries to the chest or abdomen—it’s like a bomb went off.”²⁰¹ The other article from the *Washington Post* quotes a doctor who observes that “[i]f a 9mm bullet strikes someone in the liver . . . that person might suffer a wound perhaps an inch wide, . . . [b]ut if you’re struck in the liver with an AR-15, it would be like dropping a

197. CHIVERS, *supra* note 191, at 289 (footnote omitted). Dr. Fackler recounts that there were other claims in the 1960s and 70s that the M16’s high-velocity bullets caused “massive” and “devastating” injuries, but these claims were disproven or contradicted by other reports. Delegates to war surgery conferences in the early 1970s “reported no unusual problems associated with ‘high-velocity’ bullet wounds in Vietnam. There were no reports of rifle bullet wounds causing traumatic amputations of an extremity.” Fackler, *Gunshot Wound Review*, *supra* note 185, at 194–95.

198. *Worman v. Healey*, 922 F.3d 26, 39, J.A. 0853 (1st Cir. 2019) (citing an affidavit of Christopher Colwell, M.D.). For the differences between emergency room doctors and trauma surgeons, see Marijke Vroomen Durning, *Trauma Surgeons v. ER Doctors: What’s the Difference?*, UCLA DAVID GEFEN SCH. OF MED. (Feb. 28, 2017), <https://medschool.ucla.edu/body.cfm?id=1158&action=detail&ref=937> (noting that trauma surgeons take care of severely injured patients from surgery through rehabilitation and discharge, while emergency room doctors initially stabilize the patient).

199. 922 F.3d at 39, J.A. 0854 (internal quotation marks omitted) (quoting the affidavit of Dr. Colwell, M.D.).

200. *Id.* (citations omitted).

201. *Id.* (internal quotation marks omitted) (quoting Gina Kolata & C.J. Chivers, *Wounds from Military-Style Rifles? ‘A Ghastly Thing to See’*, N.Y. TIMES (Mar. 4, 2018), <https://www.nytimes.com/2018/03/04/health/parkland-shooting-victims-ar15.html>).

watermelon onto the cement. It just is disintegrated.”²⁰² To understand why these accounts are misleading, factors that affect wound severity must be examined.²⁰³

a. The Fundamentals of Wound Ballistics

Like most modern rifles, the AR-15 fires “high-velocity” bullets while most modern handguns fire “low-velocity” bullets.²⁰⁴ But more velocity does not necessarily mean greater wound severity—a ping-pong ball and a rifle bullet fired at the same velocity will produce very different terminal results.²⁰⁵ Compare the wounding effects of 00-buckshot from a twelve-gauge shotgun, a .44 caliber Magnum hollow-point bullet, and .22 caliber rimfire bullet—all three fired from a distance of about fifteen feet.²⁰⁶ The shotgun will cause far more tissue disruption than the .44 Magnum handgun, and the .44 Magnum handgun will cause far more disruption than the .22 rifle, despite the

202. *Id.* at 39–40 (alteration in original) (internal quotation marks omitted) (quoting Tim Craig et al., *As the Wounded Kept Coming, Hospitals Dealt with Injuries Rarely Seen in U.S.*, WASHINGTON POST (Oct. 3, 2017), https://www.washingtonpost.com/national/health-science/as-the-wounded-kept-coming-hospitals-dealt-with-injuries-rarely-seen-in-the-us/2017/10/03/06210b86-a883-11e7-b3aa-c0e2e1d41e38_story.html).

203. What follows is a general discussion of wound ballistics as it ultimately relates to AR-15 lethality. For more detailed explanations of wound ballistics, see generally Martin L. Fackler, *Civilian Gunshot Wounds and Ballistics: Dispelling the Myths*, 16 EMERGENCY MED. CLINICS 17 (1998) [hereinafter Fackler, *Civilian Gunshot Wounds*]; Fackler, *Gunshot Wound Review*, *supra* note 185; Jeremy J. Hollerman et al., *Gunshot Wounds: 1. Bullets, Ballistics, and Mechanisms of Injury*, 155 AM. J. ROENTGENOLOGY 685 (1990); Panagiotis K. Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries—Part 1: Missile Characteristics and Mechanisms of Soft Tissue Wounding*, 43 INT’L J. ORAL & MAXILLOFACIAL SURGERY 1445 (2014) [hereinafter Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*]; Panagiotis K. Stefanopoulos et al., *Wound Ballistics of Military Rifle Bullets: An Update on Controversial Issues and Associated Misconceptions*, 87 J. TRAUMA & ACUTE CARE SURGERY 690 (2019) [hereinafter Stefanopoulos et al., *Wound Ballistics of Military Rifle Bullets*]; Martin L. Fackler, *Wound Profiles*, WOUND BALLISTICS REV., 2001, at 25 [hereinafter Fackler, *Wound Profiles*].

204. Velocity is measured at the point the bullet leaves the muzzle of the firearm. There is no scientific or industry definition of “high-velocity.” For American researchers who typically assign numerical values to the term, high-velocity bullets generally refer to bullets that travel at least 2,500 feet per second, while low-velocity bullets travel at 1,200 feet per second or less. *See, e.g.*, Rhee et al., *supra* note 186, at 855–56.

205. Thanks to Dr. Paul Maurer for this helpful illustration.

206. *See* Fackler, *Civilian Gunshot Wounds*, *supra* note 203, at 23.

fact that all three have approximately the same muzzle velocity.²⁰⁷ While a bullet’s velocity can affect wound severity, it is not the sole measure.²⁰⁸

A related factor is the amount of energy the bullet transfers or “deposits” to a body when it hits. This is commonly known as “kinetic energy” and is measured in foot pounds (a force of one pound moving through a distance of one foot) (ft/lbs).²⁰⁹ Both velocity and bullet mass contribute to kinetic energy with velocity being the greater determinant as shown in the formula for calculating kinetic energy: one-half bullet mass times velocity squared ($KE = \frac{1}{2}mv^2$).²¹⁰ The following table compares the typical velocity and kinetic energy of modern handgun, rifle, and shotgun projectiles measured at the firearm’s muzzle and at a distance of one hundred yards:²¹¹

Caliber	Bullet Weight Grains	Velocity @Muzzle ft/s	Velocity @100 yds ft/s	Energy @Muzzle ft/lbs	Energy @100 yds Ft/lbs
Handguns					
9 mm	115	1,140	954	332	232
.357 Magnum	125	1,500	1,147	624	365
.40 S&W	175	1,010	899	396	314
.44 Mag	200	1,500	1,196	999	635
.45 ACP +P	230	950	872	461	385
Long-guns					
.22LR Rimfire	40	1,070	908	102	73

207. *Id.*; see, e.g., *Power-Shok Buckshot 12 Gauge*, FED. PREMIUM, <https://www.federalpremium.com/shotshell/power-shok/power-shok-buckshot---low-recoil/11-F130+00.html> (last visited Sept. 25, 2020) (listing the Federal Power-Shok twelve-gauge 2.75 inch 00-buckshot velocity as 1,290 ft/s); *Power-Shok Handgun 44 Rem Magnum*, FED. PREMIUM, <https://www.federalpremium.com/handgun/power-shok/power-shok-handgun/11-C44A.html> (last visited Sept. 25, 2020) (listing the Federal Power-Shok .44 Rem Magnum JHP 240 gram velocity as 1230 ft/s); *Small Game 22 LR*, FED. PREMIUM, <https://www.federalpremium.com/rimfire/federal-small-game-and-target/game-shok/11-710.html> (last visited Sept. 25, 2020) (listing the Federal Game-Shok .22LR 40 gram velocity as 1,240 ft/s).

208. See Fackler, *Civilian Gunshot Wounds*, *supra* note 203, at 18 (“The false belief that a bullet damages tissue in direct proportion to its velocity is widespread.”); Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*, *supra* note 203, at 1448 (“[C]urrent thinking suggests that the impact velocity can be misleading as the sole indicator of the extent and severity of the inflicted wound.” (footnotes omitted)).

209. Rhee et al., *supra* note 186, at 855–56.

210. *Id.* at 855.

211. The table figures are based on various bullet data available generally at hornady.com, federalpremium.com, and cci-ammunition.com.

.223/5.56	55	3,240	2,854	1,282	995
.223/5.56	62	3,060	2,714	1,289	1,014
.243 Win	90	3,150	2,911	1,983	1,693
.260 Rem	129	2,930	2,737	2,459	2,145
6.5 Creedmoor	143	2,700	2,557	2,315	2,076
.270 Win	145	2,970	2,796	2,840	2,516
.308 Win	165	2,700	2,496	2,670	2,282
.30-06	178	2,750	2,582	2,989	2,635
.300 Win Mag	180	2,960	2,766	3,502	3,058
.338 Lapua Mag	270	2,800	2,680	4,699	4,304
.50 BMG	750	2,820	2,728	13,241	12,388
12-gauge shotgun slug	438	1,610	1,139	2,521	1,262

Rifle and shotgun projectiles, including the AR-15's .223/5.56 bullet, strike with much higher kinetic energy than handgun bullets. But among rifle bullets, the .223/5.56 strikes with much less kinetic energy.

How bullets injure and kill has less to do with velocity and kinetic energy than with the location of impact, the bullet's physical characteristics (mass, shape, and construction), and the type of tissues disrupted along the bullet's path.²¹² Two wounding mechanisms cause tissue damage: (1) the tissue in the bullet's path will be permanently *crushed*; and (2) the tissue surrounding the bullet's path may be temporarily *stretched*.²¹³ The tissue crushed by the bullet as it passes through the body is called the permanent cavity or wound track.²¹⁴ The size of the permanent cavity is proportional to the size of the bullet.²¹⁵ If the bullet is traveling fast enough, the pressure wave following the bullet also can cause transient displacement of tissue surrounding the wound track, which is called the temporary cavity.²¹⁶ Temporary cavitation also can cause significant wound damage, but "[t]he degree of injury produced by temporary cavitation is quite variable, erratic, and highly dependent

212. Fackler, *Civilian Gunshot Wounds*, *supra* note 203, at 19; Fackler, *Gunshot Wound Review*, *supra* note 185, at 202.

213. Hollerman et al., *supra* note 203, at 686–88.

214. *Id.* at 686.

215. Paul J. Dougherty et al., *Urban Gunshot Wound Ballistics*, 21 *TECHS. ORTHOPEDICS* 181, 182 (2006).

216. Fackler, *Gunshot Wound Review*, *supra* note 185, at 197–99; Hollerman et al., *supra* note 203, at 687–88.

on anatomic and physiologic considerations.”²¹⁷ Such considerations include the size and location of the temporary cavity on the bullet’s path and the elasticity of the tissue affected.²¹⁸ Less elastic tissue such as the brain, liver, and kidney and fluid-filled organs such as the heart are more likely to shatter, rupture, or tear due to temporary cavitation.²¹⁹ More elastic tissue such as muscle, lungs, skin, and blood vessels and empty or hollow organs such as the stomach, bladder, or intestines can absorb energy, making them much more resistant to injury caused by temporary cavitation.²²⁰ Bone fractures from temporary cavitation are rare—when a bone is shattered, it typically is due to being struck by the bullet.²²¹ Wound injuries to extremities normally come from being hit by the bullet or bullet fragments (or bone fragments if the bone is hit) rather than by temporary cavitation.²²²

The bullet’s shape and construction determine its tendency to deform, fragment, or yaw once it strikes, which can greatly affect its wounding potential.²²³ When striking tissue with sufficient velocity, expanding hollow-point or soft-point bullets deform as their tip flattens or “mushrooms,” giving the bullet a larger diameter, which crushes more tissue and increases the size of both the permanent and

217. Letter from Gary K. Roberts, D.D.S., Stan. Univ. Med. Ctr. (Mar. 31, 2013) (available at <http://nebula.wsimg.com/fb54bbe7bcde47ffde93ea48ce9b9f13?AccessKeyId=D0DCC35FC05D0FC60556&disposition=0&alloworigin=1>); *see also* Fackler, *Gunshot Wound Review*, *supra* note 185, at 199 (“[T]he damage caused in the human body by a bullet’s temporary cavity can vary greatly, depending on the size of the cavity and its anatomic location.”).

218. Fackler, *Gunshot Wound Review*, *supra* note 185, at 199.

219. Hollerman et al., *supra* note 203, at 688.

220. Letter from Gary K. Roberts, *supra* note 217; *see also* Hollerman et al., *supra* note 203, at 688.

221. Fackler, *Gunshot Wound Review*, *supra* note 185, at 199 (“When a bone is broken by cavitation, the fracture is a simple one. A gunshot fracture with multiple bone fragments separated by several centimeters and usually mixed with fragments of the projectile is a clear sign that the bone was struck by the bullet and not damaged by temporary cavitation.”).

222. Hollerman et al., *supra* note 203, at 688 (“[A]lthough formation of a large temporary cavity often has devastating effects in the brain or liver, its effects in wounds of the extremities has frequently been exaggerated Fracture of large bones not hit by the bullet and tearing of major vessels or nerves by the temporary cavity . . . are rare in clinical experience. This includes a systematic review of [1,400] rifle wounds sustained in the Vietnamese War and analyzed in the Wound Data and Munitions Effectiveness Team (WDMET) study.” (citation omitted)).

223. Fackler, *Gunshot Wound Review*, *supra* note 185, at 195.

temporary cavities.²²⁴ This occurs with both higher-velocity rifle bullets and lower-velocity handgun bullets, although temporary cavitation typically is not as large with medium and smaller caliber handgun rounds.²²⁵ Depending on their velocity and construction, expanding soft-point bullets also can fragment in tissue, with the fragments spreading out and creating their own wound tracks separate from the main wound track.²²⁶ These fragments greatly increase the permanent cavity size as they tear and detach tissue displaced by the temporary cavity.²²⁷ For expanding rifle bullets, “[m]ushrooming increases the presented area by four to six times, making the bullet not only blunter but also stable, thus preventing tumbling,” but creating early massive cavitation.²²⁸ A deforming or fragmenting bullet from a powerful handgun “can also produce ‘high-energy’ effects to tissue, resembling those from a much faster assault rifle bullet.”²²⁹

Full metal jacket (FMJ) bullets—sometimes called “ball ammo”—do not expand or flatten.²³⁰ These non-deforming bullets penetrate to greater depths but make smaller permanent and temporary

224. Stefanopoulos et al., *Wound Ballistics of Military Rifle Bullets*, *supra* note 203, at 696; *see also* Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*, *supra* note 203, at 1451–52; *id.* at 1446 (noting that expanding bullets [either] have their tip exposed (soft-point) or hollowed out (hollow-point)).

225. *See* Fackler, *Common Misconceptions*, *supra* note 185, at 2731 (“Temporary cavitation is not a modern phenomenon associated exclusively with projectiles of high velocity.”); Fackler, *Gunshot Wound Review*, *supra* note 185, at 199–200 (describing the temporary cavitation caused by common expanding handgun rounds); Hollerman et al., *supra* note 203, at 687 (“The temporary cavity caused by common handgun bullets is too small to be a significant wounding factor in all but the most sensitive tissues (brain and liver). . . . [L]arge handgun bullets (e.g., .44 magnum) often induce a large temporary cavity” (footnotes omitted)).

226. Rhee et al., *supra* note 186, at 863; Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*, *supra* note 203, at 1451, 1454 (noting that expanding lower-velocity handgun rounds typically do not fragment unless they strike bone).

227. Fackler, *Civilian Gunshot Wounds*, *supra* note 203, at 22.

228. Stefanopoulos et al., *Wound Ballistics of Military Rifle Bullets*, *supra* note 203, at 696; *see* Hollerman et al., *supra* note 203, at 686.

229. Stefanopoulos et al., *Wound Ballistics of Military Rifle Bullets*, *supra* note 203, at 696.

230. With FMJ bullets, the soft lead inner core is covered by a thin jacket of harder metal (typically copper or steel alloy), which keeps the bullet from expanding or flattening in tissue. *Id.* The Hague Convention of 1899 banned the use of hollow-point ammunition in international warfare. The United States was not a signatory to the Convention but generally follows this practice. *See* Christian Beekman, *Why the US Military Should Switch to Hollow-Points*, TASK & PURPOSE (Jan. 8, 2015, 3:27 PM), <https://taskandpurpose.com/argument-us-military-switch-hollow-points>.

cavities.²³¹ Non-deforming rifle bullets can yaw after they strike, increasing wound severity. The center of gravity for the typical rifle bullet with a pointed, oblong shape (sometimes called a “Spitzer” bullet)²³² is closer to the bullet’s base than its point. The natural tendency for the bullet to travel base-forward is overcome during flight by the firearm’s rifled barrel spinning the bullet fast enough to give it sufficient gyroscopic stability to maintain an aerodynamic point-forward position.²³³ When the bullet strikes, it produces minimal damage as it travels point-forward through tissue at the beginning of the wound track,²³⁴ but as it goes deeper it decelerates, becomes unstable, and can yaw as much as 180 degrees so that the base becomes the leading edge.²³⁵ “Yaw in tissue has a major influence on the wounding process because it involves a greater projectile area contacting and severing more tissue. As the bullet approaches [ninety degrees] of yaw, its entire length acts to [a]ffect tissue disruption in the extreme, resulting in maximum energy transfer.”²³⁶ Not only does the bullet’s yaw create a larger permanent wound track, it also produces a larger temporary cavity.²³⁷ Most non-deforming handgun bullets yaw to some degree, but usually not enough to cause significant additional damage.²³⁸ Non-deforming bullets also may fragment due to stress from traveling sideways when yawing or after striking bone, increasing wound severity.²³⁹

231. See Fackler, *Common Misconceptions*, *supra* note 185, at 2732 (noting that the damage from a nondeforming bullet was only slightly larger than the bullet dimensions).

232. Rhee et al., *supra* note 186, at 858 (noting that “Spitzer” comes from the German word Spitzgeschoss, meaning “pointy bullet”).

233. Fackler, *Wound Profiles*, *supra* note 203, at 35 fig.21. A common misconception is that increased wound severity is due to a bullet yawing or tumbling *in flight* before it hits the target. Properly designed bullets fired from rifled barrels (i.e., having spiral grooves that spin the bullet as it travels down the barrel) yaw no more than a few degrees during flight. See Fackler, *Common Misconceptions*, *supra* note 185, at 2732.

234. See Fackler, *Gunshot Wound Review*, *supra* note 185, at 202 (“The damage caused by the [FMJ] military rifle bullet before it yaws . . . cannot be differentiated from that caused by a handgun bullet even by the most expert.” (footnotes omitted)).

235. Rhee et al., *supra* note 186, at 863.

236. Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*, *supra* note 203, at 1450 (footnotes omitted).

237. Fackler, *Civilian Gunshot Wounds*, *supra* note 203, at 19.

238. Panagiotis K. Stefanopoulos et al., *Gunshot Wounds: A Review of Ballistics Related to Penetrating Trauma*, 3 J. ACUTE DISEASE 178, 182 (2014).

239. Hollerman et al., *supra* note 203, at 686–87.

The distance non-deforming rifle bullets travel in tissue before they yaw affects wound severity. About 70% of military 5.56mm FMJ bullets travel point-forward an average of about five inches before beginning to yaw.²⁴⁰ About 15% yaw at a shallower depth of penetration while the other 15% yaw at greater depth.²⁴¹ One variable in determining the distance to yaw is the bullet’s “angle of attack” (AOA) when initially striking the target at short distances. The straighter the bullet hits the target, the longer it will take to yaw after it strikes.²⁴² Thus, despite its high-velocity impact, a non-deforming FMJ rifle bullet can pass completely through a human target without significant yaw, causing minimal damage unless it strikes a vital organ, bone, or other critical structure.²⁴³ This explains the multiple battlefield reports discussed earlier of 5.56mm FMJ bullets passing through enemy combatants.²⁴⁴ Dr. Fackler recounts that:

[i]n 1980, I treated a soldier shot accidentally with an M16 M 193 bullet from a distance of about ten feet. The bullet entered his left thigh and traveled obliquely upward. It exited after passing through about eleven inches of muscle. The man walked [into] my clinic with no limp whatsoever: the entrance and exit holes were about 4mm across, and punctate. X-ray films showed intact bones, no bullet fragments, and no evidence of significant tissue disruption caused by the bullet’s temporary cavity. The bullet path passed well lateral to the femoral vessels. He was back on duty in a few days. Devastating? Hardly.²⁴⁵

Dr. Fackler further notes that “[i]n my experience and research, at least as many M16 users in Vietnam concluded that [the 5.56mm

240. Fackler, *Gunshot Wound Review*, *supra* note 185, at 197 fig.4, 200 fig.7.

241. *Id.*

242. See Stefanopoulos et al., *Wound Ballistics of Military Rifle Bullets*, *supra* note 203, at 695.

243. See Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*, *supra* note 203, at 1451, 1454 tbl.2; Stefanopoulos et al., *Wound Ballistics of Military Rifle Bullets*, *supra* note 203, at 695.

244. See Stefanopoulos et al., *Wound Ballistics of Military Rifle Bullets*, *supra* note 203, at 695; *supra* text accompanying notes 38–44.

245. Martin L. Fackler, *Literature Review*, WOUND BALLISTICS REV., 2001, at 39, 40 [hereinafter Fackler, *Literature Review*].

M193 round] produced unacceptably minimal, rather than ‘massive,’ wounds.”²⁴⁶

Both deforming (soft-point and hollow-point) and non-deforming (FMJ or “ball”) ammunition for handguns and rifles are available on the civilian market, the latter typically costing less. To summarize the behavior of these bullets in tissue: soft-point and hollow-point rifle bullets begin to deform (expand or mushroom) within the first inch or two after striking tissue and often fragment, causing larger permanent and temporary cavities.²⁴⁷ Depending on where they strike, these bullets can produce more severe wounds than non-deforming FMJ bullets, which do not expand or mushroom.²⁴⁸ Non-deforming rifle bullets, however, typically begin to yaw after traveling about five inches in tissue and then may fragment.²⁴⁹ Only when non-deforming rifle bullets yaw to ninety degrees or fragment is their most severe wounding potential realized.²⁵⁰ Sometimes non-deforming rifle bullets exit the body before significant yaw occurs.²⁵¹ With a person who is smaller or slimmer in stature, a non-deforming rifle bullet may pass through and exit without tumbling or fragmenting, leaving a small wound channel and mild injury (assuming it misses vital organs or bones).²⁵² Even with larger persons, a non-deforming FMJ rifle bullet typically will pass through an extremity unless it strikes bone.²⁵³ Most hollow-point handgun bullets will deform or mushroom on impact (although the degree of deformation varies), and FMJ bullets typically will yaw, but the permanent and temporary cavities

246. *Id.*

247. Fackler, *Civilian Gunshot Wounds*, *supra* note 203, at 22 figs.3 & 4 (comparing the wound profile for a .308 soft-point hunting bullet with the wound profile for a military 7.62mm FMJ bullet); Fackler, *Common Misconceptions*, *supra* note 185, at 2731 fig.2, 2733 fig.5, 2734 (illustrating the wound profiles for the military 5.56mm FMJ bullet and the civilian .223 soft-point bullet). Dr. Stefanopoulos has compiled a helpful chart summarizing handgun and rifle bullet behavior in tissue. See Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*, *supra* note 203, at 1454 tbl.2.

248. Hollerman et al., *supra* note 203, at 687–89.

249. *See id.* at 687.

250. *Id.* at 689.

251. *See* Fackler, *Literature Review*, *supra* note 245, at 40.

252. Stefanopoulos et al., *Wound Ballistics of Military Rifle Bullets*, *supra* note 203, at 695; Fackler, *Literature Review*, *supra* note 245, at 40.

253. Fackler, *Literature Review*, *supra* note 245, at 40; *see* Fackler, *Civilian Gunshot Wounds*, *supra* note 203, at 26 (“This is not to say, however, that a bullet could not cause considerable disruption in the muscles of the extremity and still have a small punctate entrance and exit wound.”).

cause by the these bullets—unless they are larger caliber magnum bullets—typically are smaller than rifle bullets, causing less severe injury.²⁵⁴

Shotguns are low-velocity weapons, but at close range, their pellets or slugs have considerable wounding potential. At less than ten feet, “the shotgun produces the most devastating injuries of all small arms.”²⁵⁵ The kinetic energy of typical twelve-gauge 00 buckshot fired at 1,200 fps is about 1,700 ft/lbs at the muzzle.²⁵⁶ Wounding is severe due to the pellets acting as a single large projectile, their rapid deceleration and transfer of all their energy to tissue, and the creation of multiple wound tracks due to the so-called “billiard ball effect” scattering the pellets inside the tissue.²⁵⁷ Shotgun pellets do not produce a temporary cavity like expanding, yawing, or fragmenting handgun and rifle bullets, but “[t]hese wounding effects . . . are of lesser extent compared to the distinctively massive injuries produced by shotgun blasts.”²⁵⁸ Shotgun slugs deform and cause temporary cavitation, “produc[ing] massive internal injuries within a range of [one hundred] meters, comparable in severity to those encountered from hunting rifle bullets.”²⁵⁹ The kinetic energy of a typical twelve-gauge shotgun slug is around 2600 ft/lbs, which approximates the energy of larger caliber rifle bullets (see table above).²⁶⁰

b. Wound Ballistics and AR-15 Lethality

Banning the AR-15 because of its devastating wounding effects requires a level of generalization and decontextualization that ignores critical factors involving wound ballistics. First, the AR-15 does not *invariably* cause massive wounds—a point repeatedly omitted by medical advocates for “assault weapon” bans. The single most important determinant of wound severity is shot placement, not the

254. See Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*, *supra* note 203, at 1454 tbl.2 (comparing the behavior of different bullets in human tissue).

255. *Id.* (footnotes omitted).

256. Jeff Johnston, *Muzzle-Energy Math: Comparing Shotgun Gauges for Home Defense*, NRA SHOOTING ILLUSTRATED (Dec. 30, 2018), <https://www.shootingillustrated.com/articles/2018/12/30/muzzle-energy-math-comparing-shotgun-gauges-for-home-defense/>.

257. Stefanopoulos et al., *Wound Ballistics of Military Rifle Bullets*, *supra* note 203, at 696 (footnotes omitted).

258. Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*, *supra* note 203, at 1454 (footnotes omitted).

259. *Id.* at 1453 (footnotes omitted).

260. See *supra* note 211 and accompanying text.

type of firearm used. Every projectile—whether fired from a handgun, rifle, or shotgun—can seriously injure or kill if it hits the brain, spinal cord, heart, or other vital organ. Wound severity depends largely on the type and quantity of tissue disruption, which in turn depends on the location of the bullet strike.²⁶¹ A small pistol wound to the brain will be far more devastating than a large rifle wound to an extremity or other non-vital part of the torso. Dr. Peter Rhee notes that “[m]ost experienced trauma surgeons will testify that what part of the body is hit by [the] gun is more important than the size of the gun.”²⁶²

Precise shot placement is unlikely in many mass shootings where the shooter is firing on the move from an unsupported position, potential victims are fleeing or moving to cover, and greater distances exist between the shooter and his targets. When the mass shooter is moving slowly and potential victims are close and stationary, shot placement can be more precise. But in those cases, because all guns can kill, lethal outcomes are even less contingent on the type of weapon used.²⁶³ Additionally, as explained above, there are other terminal variables that affect AR-15 wound severity, such as the type of ammunition used, whether the victim has a small or slender stature, and how the bullet interacts with tissue. While generalizations must be made at some point, courts should not do so without considering the variables involved. The more important question is whether the variables affecting AR-15 wound severity permit such broad and persistent generalizations when the deprivation of a constitutional right is at issue.

Second, to classify a firearm as “exceptionally lethal,” there must be a baseline for comparison. Ban proponents attempt to make the AR-15 rifle appear exceptionally lethal by comparing it to less

261. Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*, *supra* note 203, at 1449 (“It should also be remembered that it is the proximity of the wound to vital organs that ultimately determines the severity and outcome of the injury.” (footnote omitted)).

262. Rhee et al., *supra* note 186, at 865.

263. Handguns were used exclusively in seven of the twenty highest-casualty mass shootings since 1984, rifles in four, and multiple firearms (handguns, rifles, shotguns) in eleven. See Mark Follman et al., *US Mass Shootings, 1982–2020: Data from Mother Jones’ Investigation*, MOTHER JONES (Feb. 26, 2020, 4:15 PM), <https://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data/>.

powerful handguns.²⁶⁴ The AR-15 does fire high-velocity bullets that impact with much greater force than handguns.²⁶⁵ But that is true of virtually *all* rifles—it is not unique to the AR-15.²⁶⁶ The fact that handguns are less terminally effective than rifles is nothing new. Comparing “high-velocity” or “high-powered” AR-15 bullets to handgun bullets to prove the AR-15’s exceptional lethality is like comparing a Ferrari to a minivan to prove the Ferrari is extremely fast. The AR-15-to-handgun comparison serves only to differentiate wounds caused by rifles from wounds caused by handguns. Multiple media articles describing massive and devastating wounds caused by the AR-15—such as those cited in *Worman*—almost never describe or compare similar massive and devastating wounds caused by larger-caliber rifles and shotguns.²⁶⁷ This lack of context distorts the wounding effects of the AR-15.

There is no doubt that the AR-15 can cause serious and lethal wounds, but so can other rifles, shotguns, and powerful handguns. The AR-15’s terminal performance is no more lethal than common hunting rifles. As the above table shows, the AR-15’s smaller .223/5.56 bullets strike with only one-fourth to one-half of the energy of most other centerfire rifle bullets despite having higher velocities.²⁶⁸ Wound profiles from the Army’s Wound Ballistics Laboratory illustrate the permanent and temporary cavities, penetration depth, deformation, and fragmentation of both the deforming (soft-point) AR-15 .223 caliber bullet, the non-deforming 5.56mm FMJ bullet, and

264. See, e.g., Heather Sher, *What I Saw Treating the Victims from Parkland Should Change the Debate on Guns*, ATLANTIC (Feb. 22, 2018), <https://www.theatlantic.com/politics/archive/2018/02/what-i-saw-treating-the-victims-from-parkland-should-change-the-debate-on-guns/553937/> (comparing “devastatingly lethal, high-velocity” AR-15 bullets with “low-velocity” handgun bullets that cause “routine” injuries); 60 Minutes, *The Explosive Force of AR-15 Style Rifles*, YOUTUBE (Nov. 4, 2018), <https://www.youtube.com/watch?v=edsml6UCj4w> (comparing damage to ballistics gelatin and bone-in cut of pork by 9mm handgun bullet and AR-15 bullet, showing AR-15 bullet as much more devastating).

265. See *supra* note 211 and accompanying table.

266. See *supra* note 211 and accompanying table.

267. See, e.g., Jenny Marder & Laura Santhanam, *What a Bullet Does to a Human Body*, PBS NEWS HOUR (Feb. 17, 2018, 11:05 AM), <https://www.pbs.org/newshour/nation/what-a-bullet-does-to-a-human-body>; Leana Wen, *What Bullets Do to Bodies*, N.Y. TIMES (June 15, 2017), <https://www.nytimes.com/2017/06/15/opinion/virginia-baseball-shooting-gun-shot-wounds.html>; Sarah Zhang, *What an AR-15 Can Do to the Human Body*, WIRED (June 17, 2016, 9:00 AM), <https://www.wired.com/2016/06/ar-15-can-human-body/>.

268. See *supra* note 211 and accompanying table.

other larger caliber bullets typically used in hunting rifles.²⁶⁹ A comparison of profiles for the AR-15's .223/5.56 soft-point and FMJ bullets with the wound profiles for larger-caliber hunting and competition rifle bullets, such as the 6mm PPC (.243), .30-30, and .308 soft-point bullets, shows that the wounding effects of the larger-caliber bullets are at least as extensive as the .223/5.56, and typically more so.²⁷⁰ Dr. Fackler notes that "[t]he 7.62 NATO rifle bullet is the civilian .308 Winchester: it is effective for shooting essentially all North American big game, including moose, elk, and grizzly bear. The 5.56mm NATO rifle bullet is the civilian .223 Remington: it is a 'varmint' cartridge, used effectively for shooting woodchucks, crows, and coyotes."²⁷¹ Because of its smaller size, there is an ongoing debate among hunters over whether the .223 round has adequate terminal performance for taking deer.²⁷² Some states ban the use of .223 caliber rifles when hunting deer and other animals larger than varmints because their rounds lack sufficient power.²⁷³

The AR-15's terminal performance also is no more lethal than shotguns. When firing at close range, as often occurs in mass public shootings, AR-15 wounds typically are less severe than shotgun wounds. Dr. Fackler observes that at close range "the [twelve-gauge] shotgun (using either buckshot or a rifled slug) is far more likely to incapacitate than is a .223 rifle. The [twelve-gauge] shotgun is simply

269. See generally Fackler, *Wound Profiles*, *supra* note 203 (discussing the wound profiles of an AR-15 .223 caliber bullet, 5.56mm FMJ bullet, and others).

270. See *id.* at 29 fig.3, 30 fig.7, 31 figs.9 & 10, 33 fig.14, 34 fig.17.

271. Fackler, *Literature Review*, *supra* note 245, at 41.

272. See, e.g., John Haviland, *Deer Cartridge Showdown: .223 Rem. Vs .30/30*, OUTDOOR LIFE (Nov. 15, 2019), <https://www.outdoorlife.com/blogs/hunting/ammo-test-223-rem-vs-3030-whitetails/>; Keith Wood, *Is the .223 Remington a Viable Deer Cartridge?*, N. AM. WHITETAIL (Feb. 26, 2014), <https://www.northamericanwhitetail.com/editorial/223-remington-viable-deer-cartridge/263043>.

273. See, e.g., COLO. CODE REGS. § 406-2:203(A)(1) (2020) (requiring, at a minimum, a .24 caliber round for hunting big game); Va. Dep't of Wildlife Res., *General Information & Hunting Regulations*, <https://dwr.virginia.gov/hunting/regulations/general/#legal-use> (last visited Feb. 25, 2021) (prohibiting centerfire rifle ammunition smaller than .23 caliber for deer, bear, and elk); Wash. Dep't of Fish & Wildlife, *Big Game Hunting Regulations*, <http://www.eregulations.com/washington/hunting/equipment-hunting-methods/#> (last visited Feb. 25, 2021) (requiring a minimum .24 caliber centerfire rifle for hunting "big game," such as deer, elk, bear, moose, antelope, mountain goat, and bighorn sheep).

a far more powerful weapon.”²⁷⁴ Dr. P. K. Stefanopoulos, trauma surgeon and former career military officer who has written extensively on wound ballistics, confirms that at distances of less than ten feet, “the shotgun produces the most devastating injuries of all small arms.”²⁷⁵

My point is not that the AR-15 is *less* powerful or dangerous than other firearms. The AR-15 can cause severe wounds. But three federal appellate courts have asserted that the AR-15 is exceptionally lethal because it causes wounds that are “*more serious . . . far beyond* that of other firearms in general.” That is plainly false. Wounds caused by the AR-15, while potentially serious or lethal, are no more serious or lethal than wounds caused by larger-caliber hunting rifles, shotguns, and even some powerful handguns.²⁷⁶ This fact is obscured by media reporting of “assault weapon” wound damage, especially when those reports describe such damage in nonscientific and hyperbolic terms. Reports of medical professionals describing devastating wounds from AR-15s no doubt are disturbing, but most lack context and some may not be entirely accurate.

Such reporting is nothing new. Dr. Fackler describes how media accounts embellished the injuries suffered by five children tragically killed in 1989 at Cleveland Elementary School in Stockton, California, one of the first modern mass shootings.²⁷⁷ He performed ballistics testing on the various types of ammunition used in the shooter’s semiautomatic AK-47-style rifle and also examined the autopsies of the children killed. He explains:

Much of the media coverage generated by the Stockton shooting has contained misstatements and exaggerations. The myth of “shock waves” resounding from these “high velocity” bullets “pulverizing bones and exploding organs” (even if they were not hit by the

274. Fackler, *Questions and Comments*, WOUND BALLISTIC REV., 2001, at 5, 5 (2001); see Fackler, *Wound Profiles*, *supra* note 203, at 30 fig.6 (illustrating the wound profile of a twelve-gauge shotgun).

275. Stefanopoulos et al., *Wound Ballistics of Firearm-Related Injuries*, *supra* note 203, at 1453 (footnotes omitted).

276. See Roberts, *supra* note 173, at 16–28, for a comparison of the wounding effects of handguns, AR-15 style rifles, shotguns, including wound profiles of each.

277. Martin L. Fackler et al., *Wounding Effects of the AK-47 Rifle Used by Patrick Purdy in the Stockton, California, Schoolyard Shooting of January 17, 1989*, 11 AM. J. FORENSIC MED. & PATHOLOGY 185, 185 (1990) [hereinafter Fackler, *Wounding Effects*] (“The media seized on the Stockton incident with sensationalistic zeal. Distortions, exaggerations, and uninformed assumptions were presented as fact.”).

bullet) “like a bomb” going off in the body was repeated by the media, in certain cases even after they were furnished solid evidence that disproved these absurdities. None of the autopsies showed damage beyond the projectile path. One “expert” was quoted as stating that the death rate from “assault weapons . . . approaches 50[%].” Another, reporting on the effects of “high speed” bullets, stated that “most of those hit in an extremity will end up with amputations. If you’re hit in the trunk, it becomes a lethal injury. . .” In the Stockton schoolyard, the death rate was 14% and none of the victims died later or required extremity amputation.²⁷⁸

Dr. Fackler also recounts how Joseph D. McNamara, Chief of Police in San Diego and noted “assault weapon” ban proponent,²⁷⁹ publicly announced that “one bullet hitting a child in Stockton, took out his entire stomach.”²⁸⁰ He notes that the autopsy report for the only child killed who had stomach damage states “STOMACH: There is a perforating wound of the antrum due to passage of the bullet. The stomach is otherwise normal. There is no spillage of gastric contents.”²⁸¹ Dr. Fackler worries that “[a]n unsuspecting public and medical community might accept Chief McNamara’s highly exaggerated description as fact.”²⁸²

c. Lethality as a Metric: Summing up

Ban advocates compare the AR-15 to machine guns to show that it fires more shots faster than other firearms, resulting in more injuries and more fatalities. They compare the AR-15 to handguns to show that the bullets fired by the AR-15 produce more devastating wounds. Federal courts have embraced such claims about the AR-15’s exceptional lethality—mostly its supposed high rate of fire and

278. *Id.* at 187–88 (alteration in original) (citations omitted).

279. *See* Morgan & Kopel, *supra* note 87, at 31.

280. Fackler et al., *Wounding Effects*, *supra* note 277, at 188 (internal quotation marks omitted) (citation omitted).

281. *Id.* (internal quotation marks omitted).

282. *Id.*

massive wounding power—to justify their decisions upholding “assault weapon” bans.

The foregoing discussion shows that such comparisons are misleading. The semiautomatic-only AR-15 is not exceptional either in its rate of fire or terminal ballistics. The AR-15 is not a machine gun—its semiautomatic-only firing system produces a rate of fire nearly identical to other semiautomatic handguns, rifles, and shotguns. The AR-15’s high-velocity bullet can cause more serious wounds than a handgun, but such wounds typically are no more severe than those caused by projectiles fired from shotguns or larger-caliber hunting rifles. The round fired by the AR-15 normally penetrates less through walls than common handgun and shotgun rounds, reducing the risk to public safety from bullet over-penetration. While the AR-15’s high-velocity bullet can penetrate soft body armor worn by law enforcement officers, almost every rifle bullet has this capability. The AR-15 is more lethal in some ways but less lethal in others. In short, the AR-15 is a lethal weapon but not an *exceptionally* lethal weapon.

III. AR-15 LETHALITY: TWO FINAL QUESTIONS

Two questions often arise in connection with AR-15 lethality. The first concerns data associating “assault weapons” with high-casualty mass public shootings. The second concerns whether the features that make the AR-15 suitable for self-defense also make it most deadly for mass public shootings.

A. AR-15 Lethality and Mass Public Shootings

If “assault weapons” like the AR-15 are not exceptionally lethal, why have mass public shootings with these firearms resulted in more injuries and fatalities? There is no question that “assault weapons” have been used in high-casualty mass shootings. One oft-cited study concludes that active shooters with semiautomatic rifles have killed or wounded more victims than shooters with other types of firearms.²⁸³ While all mass public shootings have become more deadly over time,²⁸⁴ more than half of high-fatality mass shootings 2010–2019 were committed with “assault weapons,” compared to about one-

283. See generally de Jager et al., *supra* note 3.

284. See Adam Lankford & James Silver, *Why Have Public Mass Shootings Become More Deadly? Assessing How Perpetrators’ Motives and Methods Have Changed over Time*, 19 CRIMINOLOGY & PUB. POL’Y 37, 38–39 (2020).

third in previous decades.²⁸⁵ Since 1989, AR- or AK-style rifles have been used in two of the top three deadliest shootings (Las Vegas and Orlando) and in nine of the top twenty deadliest mass shootings.²⁸⁶

Does this prove that “assault weapons” like the AR-15 are far more lethal than other firearms? Not necessarily. Just because a murderer picks an “assault weapon” with which to perpetrate his crime does not make the firearm itself more deadly. Counting incidents and casualties in mass shootings involving “assault weapons” fails to answer the relevant question; namely, would there have been fewer injuries or deaths if the shooter had used a handgun, shotgun, or hunting rifle instead? If the mass shooter’s bullet strikes the victim’s head, heart, or other vital organ, it is unlikely the firearm type will make much difference. If the mass shooter fires several rounds that strike a stationary target at very close range, it is unlikely the firearm type will make much difference. Shooters with firearms other than “assault weapons” can and have produced high casualties in mass public shootings. Mass shooters armed only with handguns perpetrated high-casualty shootings at Virginia Tech (fifty-five casualties), Luby’s (forty-four casualties), and Ft. Hood (forty-four casualties), where the total casualties exceed mass shootings with “assault weapons” at El Paso (forty-eight casualties), Sutherland Springs (forty-six casualties), and Parkland (thirty-four casualties).²⁸⁷ Given these outcomes, how much does the type of weapon used matter?

To determine if “assault weapons” like the AR-15 are more lethal than other firearms, especially when used in mass public shootings, researchers must go beyond simply counting incidents and casualties. They must consider factors that are relevant to whether the type of weapon used in a mass shooting makes a difference in the outcome. This requires examining an array of variables and their interaction: the shooter’s intent, skill, weapon caliber and type, rate of fire, and total rounds fired; the duration of the shooting; the location, size, density, and posture of potential victims; and, yes, even the age and

285. See *id.* at 48 (“From 1966 to 2009, 31% of high-fatality public mass shootings were committed by perpetrators armed with a semi-automatic rifle or assault weapon, whereas from 2010 to 2019, that proportion rose to 56%.”).

286. See Follman et al., *supra* note 263.

287. *Id.*

physical condition of those victims.²⁸⁸ When a mass shooter fires into a large, dense crowd in a venue with limited routes of escape (Las Vegas, Orlando, Aurora) or shoots victims at extremely close range (Sutherland Springs, Orlando,²⁸⁹ Sandy Hook, Virginia Tech, Columbine, and others), the type of firearm used may not make a significant difference in the outcome. If the mass shooter uses multiple types of firearms (Orlando, San Bernardino, Sandy Hook, Aurora, and others), it must be determined how many casualties are associated with each weapon.²⁹⁰ “Assault weapons” alone were used in four of the twenty highest-fatality mass public shootings since 1989; in the remaining five highest-fatality shootings with “assault weapons,” the shooter also used other types of firearms.²⁹¹ Until this data is collected and analyzed, studies simplistically counting incidents and casualties in mass shootings with “assault weapons” are incomplete and potentially misleading.

Two recent studies have examined at least some of these variables. One study considered for the first time the relationship between the type of firearm used, wounding characteristics, and probability of death in mass public shootings.²⁹² Researchers led by Dr. Babak Sarani, a trauma surgeon, studied firearm types and autopsy reports for 232 victims from twenty-three mass shootings, including shootings with “assault weapons” at Orlando and Las

288. See D. C. Reedy & C. S. Koper, *Impact of Handgun Types on Gun Assault Outcomes: A Comparison of Gun Assaults Involving Semiautomatic Pistols and Revolvers*, 9 INJ. PREVENTION 151, 153 (2003) (“A number of factors such as gun caliber, wound location, and the physical condition of the victim influence whether a gunshot victim dies.”).

289. Survivors of the Orlando shooting reported that the shooter stood over victims lying on the floor and “fired additional rounds into them at point-blank range without regard for whether they were alive or already dead.” FRANK STRAUB ET AL., RESCUE, RESPONSE, AND RESILIENCE: A CRITICAL INCIDENT REVIEW OF THE ORLANDO PUBLIC SAFETY RESPONSE TO THE ATTACK ON THE PULSE NIGHTCLUB 18 (2017) (footnote omitted).

290. Research shows that mass shooters with multiple firearms kill more victims on the average than those with a single firearm. See *id.*; Lankford & Silver, *supra* note 284, at 48 (citations omitted). One flaw in the de Jager study is that it “grouped all events that involved multiple firearms in which one firearm was an assault weapon into the same group. The authors were not able to trace a particular gunshot wound to the actual weapon used to create it. This was the case in 65% of events.” Babak Sarani & E. Reed Smith, *A Holistic Approach to Firearm Legislation is Needed: In Reply to de Jager and Colleagues*, 229 J. AM. COLL. SURGEONS 324, 324 (2019). See generally de Jager et al., *supra* note 3.

291. See Follman et al., *supra* note 263.

292. Babak Sarani et al., *Wounding Patterns Based on Firearm Type in Civilian Public Mass Shootings in the United States*, 228 J. AM. COLL. SURGEONS 228, 229 (2019).

Vegas.²⁹³ A previous study of gun homicide victims (not mass shooting victims) found that handguns were associated with more wounds per victim, a higher likelihood of vital organ injury, and a higher case fatality rate (CFR).²⁹⁴ They nevertheless noted that, based on projectile velocity and accuracy, “it [made] sense to assume that” mass shootings with rifles would be more lethal than those with handguns.²⁹⁵

Dr. Sarani and his colleagues found that mass public shootings with a handgun are more lethal than those associated a rifle because they result in more wounds per victim and more injuries to vital organs.²⁹⁶ “All of us were shocked,” Dr. Sarani said, “[w]e came to the table with our bias that an assault weapon would be worse.”²⁹⁷ While recognizing that rifle projectiles cause more tissue injury than handgun projectiles, the study points out that the number of times a victim is shot also affects lethality.²⁹⁸ Contrary to claims made by federal courts and ban advocates, the study indicates that “those who were shot with a handgun were almost four times more likely to have three or more wounds compared with those shot with a rifle.”²⁹⁹ Because the number of gunshot wounds increases the likelihood of sustaining a fatal injury, the study concludes that “the probability of death is higher for events involving a handgun than a rifle.”³⁰⁰ Twenty-six percent of those shot with handguns and 16% shot with shotguns had multiple fatal organ injuries, while only 2% of those shot by a rifle had two or more fatal organ injuries.³⁰¹ The study explains that “[w]ounds to the brain and heart have higher fatality rates than gunshots to other organs, and these were most likely to occur when

293. *Id.* at 228–30.

294. *Id.* at 229 (citing Therese S. Richmond et al., *The Case for Enhanced Data Collection of Gun Type*, 57 J. TRAUMA INJ., INFECTION, & CRITICAL CARE 1356 (2004)). The CFR is “defined as the number killed divided by the number killed and wounded.” *Id.* at 228.

295. *Id.* at 228–29.

296. *Id.* at 228, 232–33.

297. Carolyn Crist, *Handguns More Lethal than Rifles in Mass Shootings*, REUTERS (Dec. 31, 2018, 1:48 PM), <https://www.reuters.com/article/us-health-gunshots/handguns-more-lethal-than-rifles-in-mass-shootings-idUSKCN1OU11G> (internal quotation marks omitted) (quoting Dr. Sarani).

298. Sarani et al., *supra* note 292, at 232.

299. *Id.*

300. *Id.*

301. *Id.* at 230.

handguns were used.”³⁰² Those shot with rifles were twice as likely to have a preventable death than those shot with other firearms.³⁰³ The study’s conclusions are different from those typically reached by incident-and-casualty counters.³⁰⁴

Professors Adam Lankford and James Silver recently examined what motivates mass public shooters to kill large number of victims.³⁰⁵ After gathering data from a wide array of sources, they identify several factors that account for the increased lethality of mass public shootings, including the desire for fame, attention, or infamy both in society and among other mass shooters; the desire to kill large numbers of victims; the influence of high-profile mass shooters on subsequent shooters; extended planning periods; more extensive attack strategy development; and more extensive weapons acquisition.³⁰⁶ Lankford and Silver observe that the shooter’s motive can affect weapon choice and that “weapons make a difference, but they do not tell the whole story To understand why public mass shootings have grown deadlier over time, multiple factors—and their interaction—must be considered.”³⁰⁷

The answer to the question about “assault weapons” and high-casualty mass shootings is that simply counting incidents and casualties is not enough. To date, current data allow for no evidence-based conclusions that the type of weapon used in a mass shooting is a major determining factor in the number of victims killed or wounded.³⁰⁸ The few studies that have examined more relevant variables suggest that it may not be.

302. *Id.* at 233.

303. *Id.* at 231.

304. *See, e.g.,* de Jager et al., *supra* note 3, at 1034 (“[M]ore people were wounded and killed in incidents in which semiautomatic rifles were used compared with incidents involving other firearms.”). *But cf. id.* (“The percentage of persons who died if wounded in incidents with a semiautomatic rifle . . . was similar to the percentage who died in incidents without a semiautomatic rifle”); Sarani et al., *supra* note 292, at 232 (finding that mass shootings solely with a rifle “resulted in a much larger number of people injured, but a small number of people killed[,]” but researchers could not account for this finding with confidence due to a small sample size).

305. *See generally* Lankford & Silver, *supra* note 284.

306. *See id.* at 41–50.

307. *Id.* at 48–49.

308. *Id.* at 38 (“To date, no one has provided a clear and compelling explanation for why public mass shootings have become deadlier over time. That may be because finding evidence-based answers is so challenging.”).

B. AR-15 Lethality and Self-defense

Do the same features that make the AR-15 useful for self-defense also make it the deadliest choice for mass shooters? The question assumes the AR-15 is both useful and used for self-defense, something federal appellate courts dispute.³⁰⁹ They suggest that recognizing such firearms as suitable for self-defense conflicts with *Heller*'s dicta that handguns are "the quintessential self-defense weapon."³¹⁰ They also claim that "assault weapons" like the AR-15 are too dangerous for self-defense—indeed, the First Circuit in *Worman* famously declared that using an "assault weapon" for home defense is "tantamount to using a sledgehammer to crack open the shell of a peanut."³¹¹

There is little doubt that the AR-15 carbine (sixteen-inch or shorter barrel) is well-suited for self-defense, especially as a primary home defense weapon. Effective self-defense requires incapacitating the attacker as quickly as possible. AR-15 ammunition typically has better terminal effectiveness than handgun rounds.³¹² The AR-15 is comparatively easy to shoot. Its lighter weight, shorter barrel, and ergonomic stock and grip make it easier to handle than most long

309. See *Worman v. Healey*, 922 F.3d 26, 37 (1st Cir. 2019) (noting that the record "offers no indication that the proscribed weapons have commonly been used for home self-defense purposes"); *Kolbe v. Hogan*, 849 F.3d 114, 138, 145 (4th Cir. 2017) (en banc) (finding "scant evidence" that the banned weapons "are possessed, or even suitable, for self-protection"); *N.Y. State Rifle & Pistol Ass'n v. Cuomo (NYSRPA)*, 804 F.3d 242, 263 (2d Cir. 2015) (noting "the dearth of evidence that law-abiding citizens typically use these weapons for self-defense"); *Heller v. District of Columbia (Heller II)*, 670 F.3d 1244, 1262 (D.C. Cir. 2011) (noting lack of proof "that semi-automatic rifles . . . are well-suited to or preferred for the purpose of self-defense"). But see *Kolbe*, 849 F.3d at 155 (Traxler, J., dissenting) (indicating that plaintiffs' expert offered evidence that self-defense is a primary reason for purchase of banned weapons, that a 1989 ATF report concluded self-defense is a suitable purpose for semiautomatic rifles, and that the state's expert conceded self-defense is one reason people keep the banned weapons in their homes).

310. *Worman*, 922 F.3d at 36–37 (internal quotation marks omitted) (quoting *District of Columbia v. Heller*, 554 U.S. 570, 629 (2008)); *Kolbe*, 849 F.3d at 132, 138, 145 (internal quotation marks omitted) (quoting *Heller*, 554 U.S. at 629); *Heller II*, 670 F.3d at 1268–69 (internal quotation marks omitted) (quoting *Heller*, 554 U.S. at 629).

311. 922 F.3d at 37; see *Kolbe*, 849 F.3d at 127 (claiming that "assault weapons" endanger bystanders by firing "more rounds than necessary" and penetrating barriers more easily than other firearms).

312. See *supra* Part II.C.2; see also *Murphy v. Guerrero*, No. 1:14-CV-00026, 2016 WL 5508998, at *17 (D. N. Mar. I. Sept. 28, 2016) ("[T]he guns that most effectively serve the purpose of self-defense also tend to cause the most grievous injuries.").

guns. Its reduced recoil makes it more manageable than shotguns or hunting rifles and helps increase the accuracy of follow-up shots. The AR-15’s standard capacity thirty-round magazine is larger than standard capacities for semiautomatic handguns (fifteen to eighteen rounds), revolvers (five to six rounds), and shotguns (three to six rounds). This ensures the firearm user is prepared for multiple defensive scenarios without carrying additional ammunition and pausing to reload, such as when facing multiple attackers in a home invasion. By contrast, handguns require a higher degree of skill to shoot accurately and hold half as many (or fewer) rounds.³¹³ Shotguns have much greater recoil, making them more difficult to control and hold an even smaller number of rounds, forcing the individual to reload under the life-or-death conditions of home defense. The AR-15 also is safer for home defense than other firearms. With the right ammunition, its bullets will penetrate less in walls or building materials than handguns or shotguns.³¹⁴ Lights and lasers easily can be attached to the AR-15’s handguard for better identification and targeting at in-house distances in low light conditions under stress. In short, the AR-15 is a relatively lightweight rifle that fires effective ammunition in a package with manageable recoil, good ergonomics, easy mounting of optics and lights, and a shorter learning curve. These features make it easier for most persons to hit human-sized targets at in-home distances in low-light conditions under stress.³¹⁵

The AR-15 not only is useful for self-defense but also is commonly used for that purpose. Federal courts have focused narrowly the number of times “assault weapons” actually have been fired in response to a threat.³¹⁶ Contrary to their findings, numerous examples exist of AR-15s or similar firearms being used effectively against actual threats.³¹⁷ But “used” should not be defined so narrowly—it should include pointing or displaying a firearm to counter a threat or even having the gun readily available in case a

313. See *supra* Part II.B.

314. See *supra* Part II.B.; *supra* Part II.C.1.

315. For a comprehensive summary of why semiautomatic rifles like the AR-15 are among the best firearms for defensive shooting, see Boone Declaration at J.A. 128–33, 138–45, *Worman*, 922 F.3d 26 (No. 18-1545).

316. See, e.g., *Kolbe*, 849 F.3d at 127.

317. See, e.g., Amy Swearer, *8 Times Law-Abiding Citizens Saved Lives with an AR-15*, DAILY SIGNAL (Mar. 14, 2018), <https://www.dailysignal.com/2018/03/14/8-times-law-abiding-citizens-saved-lives-ar-15/>. On his blog, Clayton Cramer documents numerous instances when AR-15s and other “assault weapons” have been used in self-defense against attackers. See Clayton Cramer, *Civilian Gun Self-Defense Blog*, <https://gunselfdefense.blogspot.com/search/label/assault%20weapon%20defense> (last visited Oct. 31, 2020).

threat appears.³¹⁸ Many people use an AR-15 type firearm for self-defense. They routinely train with it for that purpose and safely deploy it in their homes to be ready for possible threats.³¹⁹ To suggest that the AR-15 is neither useful nor used for self-defense is simply false.

To be sure, handguns and shotguns also have features that make them useful for self-defense. Because of their size and concealability, handguns are much better suited for concealed or vehicle carry in public. Some prefer a handgun for home defense for the reasons stated in *Heller*: it is easier to store where it can be readily accessible; it is harder for an attacker to wrestle it away; it can be used by those who do not have the strength to lift and aim a long gun; and it can be pointed at the intruder with one hand, while dialing the police with the other.³²⁰ Handguns typically are quicker to point and easier to maneuver around tight corners than a long gun, can be equipped with lights and lasers, and can provide substantial ammunition capacity for various scenarios. Some choose a handgun for home defense because they can use the same firearm for public carry, resulting in both proficiency and cost savings. Still others prefer a shotgun for home defense. Its ability to fire multiple projectiles every time the trigger is pulled gives it devastating firepower at close ranges, and there is less need for precise aiming than with handguns or rifles.³²¹ Handguns, rifles, and shotguns all have certain advantages for self-

318. See James Agresti, *Defensive Gun Use Is More than Shooting Bad Guys*, FOUND. FOR ECON. EDUC. (Feb. 27, 2018), https://fee.org/articles/defensive-gun-use-is-more-than-shooting-bad-guys/?utm_source=zapier&utm.

319. See, e.g., Stephen Gutowski, *Female Gun Owners: We Prefer the AR-15*, WASHINGTON FREE BEACON (Nov. 10, 2019, 5:00 AM), <https://freebeacon.com/issues/female-gun-owners-we-prefer-the-ar-15/>; Meghan Keneally, *AR-15 Owners Explain Why They Have Their Guns*, ABC NEWS (June 15, 2016, 4:41 PM), <https://abcnews.go.com/US/ar-15-owners-explain-guns/story?id=39873644>; Charles Scudder, *Sticking to Their Gun: Aficionados Say the AR-15 is Ideal for Civilian Sport Shooting, Self-Defense*, DALL. MORNING NEWS (July 1, 2016), <http://interactives.dallasnews.com/2016/gun-owners/>.

320. *District of Columbia v. Heller*, 554 U.S. 570, 629 (2008).

321. See *Best Tactical Shotgun for Home Defense [2020 Reviews]*, GUNPROS, <https://gunpros.com/best-tactical-shotgun-home-defense/> (last visited Oct. 5, 2020); *supra* text accompanying notes 164, 274.

defense both inside and outside the home, so it is impossible to say which firearm always is “best” for that purpose.³²²

To return to the question: do features that make the AR-15 well-suited for self-defense also make it the deadliest choice for mass killers? The question is not, as transposed in *Worman*, whether the features that make the AR-15 ideal for mass shooters also make it ideal for self-defense.³²³ It is no answer to say that because the AR-15 has “utility” for criminal misuse it also has utility for self-defense, and therefore, “assault weapon” bans sweep too broadly. Any gun useful for self-defense can be misused by mass shooters or other criminals. The relevant question is whether the AR-15 has features that make it good for self-defense, especially in the home, but do not necessarily make it equally useful for mass shootings; in other words, does the AR-15 have *more* utility for self-defense than for mass shootings? If so, given recent studies showing that “assault weapon” bans do not deter mass public shootings,³²⁴ federal courts must better explain why laws that deprive law-abiding citizens of the choice to use such firearms for home defense do not violate the Second Amendment.

There are several reasons why the AR-15 is more useful for self-defense than mass public shootings. First, the vast majority of mass shooters do not face someone shooting back, at least not for several minutes before police arrive.³²⁵ Being the only ones armed, they are free to roam and fire at will at unarmed targets, often at close range. Any type firearm gives mass shooters a substantial advantage against unsuspecting and helpless victims, who become incapable of doing much more than hiding or running away, either of which may increase their risk of being shot. In the twenty highest-casualty mass shootings since 1984, handguns were used exclusively in seven, rifles in four,

322. See, e.g., Jake Christopher, *8 Experts Pick Their Home Defense Weapon of Choice*, BALLISTIC MAG. (Aug. 28, 2015), <https://www.ballisticmag.com/2015/08/28/8-experts-pick-their-home-defense-weapon-of-choice/>; Chad Hadley, *14 of America's Tactical Experts Give Their Take on the Best Home Defense Gun*, TACTICAL HYVE, <https://tacticalhyve.com/best-home-defense-gun/> (last visited Mar. 4, 2020).

323. *Worman v. Healey*, 922 F.3d 26, 40 (1st Cir. 2019).

324. See, e.g., Webster et al., *supra* note 134, at 188 (“[B]ans on assault weapons had no clear effects on either the incidence of mass shootings or on the incidence of victim fatalities from mass shootings.”); see also ANDREW R. MORRAL ET AL., *THE SCIENCE OF GUN POLICY: A CRITICAL SYNTHESIS OF RESEARCH EVIDENCE ON THE EFFECTS OF GUN POLICIES IN THE UNITED STATES*, 61–68 (2018) (concluding that available evidence is inconclusive that “assault weapon” bans have any effect on mass shootings or firearm homicides).

325. See generally NAT'L CTR. FOR VICTIMS OF CRIME, *MASS CASUALTY SHOOTINGS* (n.d.) (noting that 66.9% of active shooter events between 2000 and 2013 ended before police arrived).

and multiple firearms (handguns, rifles, shotguns) in eleven.³²⁶ The mass shooter's choice of weapon in a surprise attack against unarmed victims will not make as much difference to the outcome as it will to the homeowner whose life may depend on having a firearm that is highly effective at stopping multiple armed intruders.³²⁷ For the homeowner facing one or more attackers most likely armed with handguns, having a superior defensive firearm like the AR-15 to overcome the assailants' advantage and gain the initiative may mean the difference between life and death for the homeowner and his or her family.

Second, mass shooters have time to plan and prepare beforehand, so they can carry multiple firearms and magazines to the scene. As noted above, multiple firearms have been used in more than half of the twenty highest-casualty mass public shootings since 1984.³²⁸ The Aurora shooter, for example, was armed with a shotgun, an AR-15 rifle, and a semiautomatic handgun.³²⁹ Mass shooters also have carried additional magazines to ensure they have sufficient ammunition to prolong their terror, including more than seventeen magazines at Virginia Tech, fifteen at Sutherland Springs, thirteen at Columbine, and five at Parkland and Newtown.³³⁰ Because the mass shooter can carry multiple firearms and multiple magazines, the ammunition capacity of any single firearm is not as critical. By contrast, the homeowner who is awakened suddenly in the middle of the night by intruders has only seconds to grab a single defensive firearm and little else not already attached to that firearm. Homeowners typically do not sleep outfitted in gear holding extra magazines and, as one firearms expert observed, "[t]he sudden and unpredictable nature of such attacks, and their occurring in relatively confined spaces, generally do not permit gathering multiple firearms or magazines."³³¹ The AR-15 with its larger-capacity magazine will have more utility for the homeowner than for the mass shooter.

Third, the AR-15 is not well-suited for the mass shooter who wants to enter a school, business, or other venue undetected. As a long gun,

326. See Follman et al., *supra* note 263.

327. See Chapman, *Firearms Chimera*, *supra* note 58, at 15–16.

328. See *supra* note 291 and accompanying text.

329. AURORA AFTER ACTION REPORT, *supra* note 132, at 12.

330. See *supra* notes 145–48, 151–54 and accompanying text.

331. See Declaration of Massad Ayoob in Support of Motion for Preliminary Injunction at 6–7, *S.F. Police Officers Ass'n v. City & Cnty. of S.F.*, 18 F. Supp. 3d 997 (N.D. Cal. 2014) (No. 13-CV-13-5351).

the AR-15 is easier to shoot more accurately than a handgun but less concealable. The AR-15’s length is an advantage for self-defense inside the home where concealability makes little difference, but it can be a disadvantage for the mass shooter who wants to approach his target unnoticed. The Virginia Tech shooter would not have been able to go into a student dormitory, kill two persons, return to his own room in another dormitory, and then walk across campus to the building where he killed thirty and wounded seventeen more if he had been carrying an AR-15.³³² In this instance, because of their concealability, the two handguns used by the Virginia Tech shooter were far more deadly than an AR-15.³³³

Fourth, the AR-15’s safety advantage over handguns and shotguns in a home defense scenario is meaningless to the mass shooter. In a defensive encounter, stray rounds can injure or kill innocent persons in the next room or nearby household. As the AR-15 is easier to shoot more accurately than other firearms, there is less chance the homeowner will miss the intended target.³³⁴ Rounds fired from the AR-15 also generally penetrate less in walls and other building materials than those from than handguns or shotguns.³³⁵ The mass public shooter has no concern for stray rounds because he typically wants to shoot as many innocent persons as possible. More accuracy and less-penetrating rounds are not required to inflict casualties on unarmed and unsuspecting targets at close range.

The AR-15 is both useful and often used for self-defense. Many features that make the AR-15 effective for self-defense also make it effective for mass shooters, but not always so. The AR-15 has distinct advantages for self-defense, especially in the home, that do not translate into advantages for mass public shooters. Federal courts refuse to recognize that the AR-15 also can be a “quintessential” home-defense weapon because “assault weapon” bans then would pose a much greater burden on the right to keep and bear arms for self-defense. Hence, the First Circuit’s resort to hyperbole in *Worman*.³³⁶

332. See TRIDATA DIV., *supra* note 150, at 74 (noting that the shooter “carried his weapons in violation of university rules, and probably knew that it was extremely unlikely that anyone would stop him to check his bag. He looked like many others.”).

333. See Francisco Alvarado, *Glock Pistols are the Overlooked Weapon in American Mass Shootings*, VICE NEWS (June 21, 2016, 4:18 PM), https://news.vice.com/en_us/article/gy9nj4/glock-pistol-omar-mateen-orlando-mass-shooting.

334. See *supra* Part II.B.

335. See *supra* Part II.C.1.

336. *Worman v. Healey*, 922 F.3d 26, 37 (1st Cir. 2019) (declaring that using an “assault weapon” for home defense is “tantamount to using a sledgehammer to crack open the shell of a peanut”).

CONCLUSION

The facts do not support claims by gun-control advocates and federal courts that “assault weapons” like the AR-15 are exceptionally lethal, far beyond non-banned firearms. The AR-15’s rate of fire is virtually identical to non-banned semiautomatic handguns, rifles, and shotguns. Its accuracy is better than some firearms but worse than others. Like any rifle, its bullets typically cause more serious wounds than handguns, but not as serious wounds as larger-caliber hunting and target rifles. And while the AR-15 has features that make it well-suited for home defense, those features do not necessarily make it far more deadly than other firearms in the hands of mass shooters. To be sure, “assault weapons” like the AR-15 have been used in some high-casualty mass public shootings, but the data does not tell us whether the casualty rate in those shootings is due to weapon type or to other factors such as shooter intent or skill, the duration and location of the shooting, or victim characteristics, location, or posture. Because “assault weapons” are not far more lethal than non-banned firearms and are equally useful for self-defense, courts must find other justifications for upholding laws that keep such firearms out of the hands of ordinary citizens.

Nobody wants guns in the hands of terrorists, criminals, or the dangerously mentally ill. Mass public shootings are unspeakable tragedies that take innocent lives, shatter families, and traumatize communities. But the question is whether “assault weapon” bans are an appropriate and effective response to the problem of mass shootings. The perception that the problem is more with the weapon than with the shooter obscures the complexities surrounding the actual causes of mass public shootings and diverts policymakers from effective prevention strategies. Lacking evidence-based reasons for concluding that AR-15s are exceptionally lethal, legislative bans are an overreaction—driven by emotion or political agendas rather than facts—and courts upholding them have no good justification for overriding the Second Amendment rights of law-abiding citizens who own (or want to own) the popular AR-15 rifle. These bans deprive such citizens of the right to choose for themselves the firearm most appropriate for their self-defense needs and do little, if anything, to deter the tragic violence perpetrated by mass shooters.

EXHIBIT 13

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Southern Illinois University Law Journal

Fall, 2018

Article

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“ASSAULT WEAPON” MYTHS

Scary black rifles that spray bullets like machine guns. Military arms designed solely for killing on the battlefield. Weapons of choice for mass shooters. These are common descriptions of so-called “assault weapons,” a favorite target for those who want to eliminate gun violence by eliminating guns. Several states and localities currently ban “assault weapons,” as did the federal government from 1994-2004. In response to recent mass shootings, bills have been introduced in Congress to create a new national ban. Lawmakers and judges often use these descriptions to justify such bans. But are the descriptions factual? If not, what does that say about the laws and court decisions that rely on them?

While there is no generally agreed-upon definition of “assault weapon,” laws banning such weapons typically criminalize possession or transfer of semiautomatic rifles with detachable magazines and at least one specified feature such as a pistol grip, telescoping stock, flash suppressor, barrel shroud, bayonet mount, or grenade launcher.¹ Other “assault weapon” bans prohibit certain semiautomatic rifles, shotguns, and pistols by name and by features, along with any copies, duplicates, or variants.² The main target of these bans is the AR-15 rifle, the most popular rifle in America, owned by millions for lawful purposes including self-defense.³ The AR-15 looks like a fully automatic military M4 carbine or M16 rifle, but it has a semiautomatic firing system like most modern handguns. Legislatures imposing “assault *194 weapon” bans nevertheless have concluded that the AR-15 is just as lethal as its military counterparts, and federal courts have agreed.

Since the Supreme Court's landmark decision in *District of Columbia v. Heller*,⁴ four federal circuit courts have rejected Second Amendment challenges to “assault weapon” bans.⁵ Two courts--the District of Columbia Circuit in *Heller v. District of Columbia (Heller II)* and the Second Circuit in *New York State Rifle and Pistol Association v. Cuomo (NYSRPA)*-- applied a weak form of intermediate scrutiny with no serious requirement of narrow tailoring to uphold the challenged bans.⁶ The Seventh Circuit in *Friedman v. City of Highland Park* declined to apply traditional levels of scrutiny, but rather considered whether the banned firearms “have some reasonable relationship to the preservation or efficiency of a well regulated militia, and whether law-abiding citizens retain adequate means of self defense.”⁷ The court ultimately upheld the ban, concluding that law-abiding citizens can find substitute weapons for self-defense and the ban may reduce casualties in mass shootings and other gun-related crime.⁸ Most recently, in a 10-4 en banc decision, the Fourth Circuit in *Kolbe v. Hogan* took the unprecedented step of upholding the challenged ban on the ground that AR-15s are not protected arms under the Second Amendment.⁹ It declared that the civilian AR-15 is an “exceptionally lethal weapon of war” that is “like” the fully automatic military M16, and therefore not constitutionally protected.¹⁰ Never mind that no national military force actually uses the AR-15 on the battlefield.

Before courts can resolve constitutional questions regarding “assault weapon” bans, they must establish certain facts about the banned weapons. How do “assault weapons” operate? Are they any different from military weapons? Are they exceptionally dangerous when compared to other firearms? Answering these questions accurately is critical to determining both whether “assault weapons” are protected arms under the Second *195 Amendment and whether broad bans of such weapons are effective in achieving the government's public safety goals.

The federal circuit court decisions provide a useful lens to view how lower courts have disregarded the Supreme Court's decision in *Heller*, and how that disregard extends even to factual determinations about the specific firearms involved. Despite considering whether "assault weapon" bans violate a constitutional right, these courts have showed little interest in seriously examining the underlying facts about the operation and use of "assault weapons." They instead rely on an amalgam of reports more than two decades old from federal agencies justifying their policy decisions, outdated crime data, skewed claims and statistics from gun-control advocates, non-scientific "studies," opinions from non-experts, and speculation offered by experts.

The Fourth Circuit in *Kolbe*, for example, cited no firearms or ballistics experts to support its multiple conclusions about how the AR-15 is functionally equivalent to the M16, but rather relied on a 1989 Bureau of Alcohol, Tobacco, and Firearms (BATF) report justifying its ban on imported "assault weapons," a 1994 congressional report citing multiple non-expert statements in support of the federal "assault weapon" ban, and statements from four Maryland police chiefs, who all conceded that they were not firearms experts, including one who admitted that he had fired an AR-15 only once.¹¹ The *Kolbe* plaintiffs produced contrary evidence from firearms and ballistic experts, but the Fourth Circuit mostly ignored it, falsely claiming that the state's evidence was "uncontroverted."¹² I doubt the court would have shown similar indifference to basic facts had *Kolbe* been a First or Fourth Amendment case.

***196** No one wants to see guns in the hands of terrorists, criminals, or the dangerously mentally ill. Mass shootings are unspeakable tragedies that result in the loss of innocent lives, heartbroken families, and devastated communities. But court decisions based on false or misleading claims about "assault weapons" have questionable legitimacy. No doubt many judges (and their law clerks) don't know how modern semiautomatic firearms operate--like many people, they have never fired a gun or only used a hunting rifle or shotgun on occasion. Courts nevertheless have a duty to "get it right" when it comes to the facts upon which their decisions are based.

This article critically examines several factual claims about "assault weapons" found in these four federal appellate court decisions. Part I introduces the problem by showing how gun-control advocates have disseminated false and misleading information about "assault weapons." Part II identifies three common myths about "assault weapons" based on this disinformation that repeatedly appear in the four decisions and drive their outcomes. It shows how these myths are perpetuated by the courts' refusal to take seriously readily-available evidence about the operation and use of these weapons, with a special focus on *Kolbe's* conclusion that the civilian AR-15 is functionally equivalent to the military M16. Part III briefly concludes with some thoughts on how having accurate facts about the operation and use of "assault weapons" can affect the broader discussion about the constitutionality of banning such firearms.

I. "ASSAULT WEAPON" DISINFORMATION

Anti-gun groups have done an effective job of demonizing "assault weapons" with very little evidence to support their descriptions. The "assault weapons" debate began in the late 1980s when handgun-ban activists like Josh Sugarmann realized that the vast majority of legislators, the public, and the media simply were not interested handgun bans.¹³ Sugarmann wrote a policy memo for the Violence Policy Center (VPC) arguing that "assault weapon" bans would be novel and appealing, and eventually strengthen the case for banning handguns.¹⁴ Pro-ban advocates, he urged, could win support by emphasizing the firearms' scary-looking features and by exploiting widespread public ignorance about how they function.

Assault weapons--just like armor-piercing bullets, machine guns, and plastic firearms--are a new topic. The weapons' menacing looks, coupled with the public's confusion over fully automatic machine guns versus semi-automatic assault weapons--anything ***197** that looks like a machine gun is assumed to be a machine gun--can only increase the chance of public support for restrictions on these weapons.¹⁵

Gun-control advocates have pressed this tactic by using machine-gun language to describe semiautomatic "assault weapons," even though they are not machine guns. For example, the VPC published a 2003 report entitled *Bullet Hoses: Semiautomatic Assault Weapons--What Are They? What's So Bad About Them?*,¹⁶ which depicts such weapons as "bullet hoses" that "enable shooters to spray ('hose down') a large number of bullets over a broad killing zone, without having to aim at each individual target."¹⁷ The report claims there are no functional differences between civilian semiautomatic rifles and the fully automatic rifles used by the military:

All assault weapons--military and civilian alike--incorporate specific features that were designed to provide a specific military combat function. That military function is *laying down a high volume of fire over a wide killing zone*, also known as "hosing down" an area. Civilian assault weapons keep the specific design features that make this deadly spray-firing easy.¹⁸

The problem with these descriptions is simple: they are false. Semiautomatic "assault weapons" such as the popular AR-15 do not "spray fire," as that term is commonly understood.¹⁹

Even the term "assault weapon" reinforces the misperception that the AR-15 is a military firearm. It's a variation on "assault rifle," a historical term describing lightweight military rifles that fire in both automatic and semiautomatic modes.²⁰ While gun-control advocates and the media use the two terms interchangeably, they actually do not refer to the same weapons. Various militaries created assault rifles in the mid-twentieth century to bridge the gap between heavy semiautomatic combat rifles firing large rounds effective at longer ranges and smaller submachine guns firing pistol rounds *198 effective only at shorter distances.²¹ The term "assault weapon," on the other hand, is not part of widely-accepted technical or historical descriptions of modern rifles. It is a political and pejorative term, useful for creating mental images of military weapons capable of deadly spray fire.²²

This disinformation campaign was designed to stir passion, not dispel ignorance. It has been very effective. After the Parkland, Florida school shooting, Lawrence Tribe, a widely-respected Harvard law professor, confidently proclaimed that the semiautomatic AR-15 "easily fires over 10 rounds per second."²³ Professor Tribe's figure is only slightly less than the "700 rounds a minute" figure offered by Representative Alan Grayson (D-FL) after the Orlando nightclub shooting in 2016.²⁴ Try pulling a semiautomatic rifle trigger 10-12 times in *one second*--it's impossible.²⁵ Then there's Michael Bloomberg, former mayor of New York and prominent gun-control advocate, who asserted in a 2012 ABC-TV interview that an "assault weapon" is fully automatic like a machine gun, firing multiple rounds with one pull of the trigger.²⁶ Jacob Sullum, writing in *Reason* magazine, recently noted that a 2013 Reason-Rupe survey showed "about two-thirds of Americans mistakenly thought 'assault weapons' fire faster than other guns, hold more rounds, or use higher-caliber ammunition. The respondents who harbored these misconceptions were especially likely to say such guns should be banned."²⁷

*199 The "spray fire" myth and other falsehoods also appear in federal court decisions upholding "assault weapon" bans. Courts rely on these myths to show that "assault weapons" are exceptionally dangerous and have no legitimate civilian utility. Once these factual premises are established, it requires little serious legal analysis to hold that there is no constitutional right to possess "assault weapons" or that bans on such firearms survive intermediate scrutiny.

II. COMMON "ASSAULT WEAPON" MYTHS

The Fourth Circuit's decision in *Kolbe* that there is no constitutional right to possess the AR-15 or any other "assault weapon" is based on a novel interpretation of *Heller* that excludes from Second Amendment protection weapons that are "like" M16

rifles--i.e., "weapons that are most useful in military service."²⁸ The court therefore had to show that the AR-15 is virtually indistinguishable from the M16. To make this showing, the Fourth Circuit turned to three common myths about how "assault weapons" work that federal courts have accepted without rigorous factual inquiry. This section examines those myths.

A. The "Weapon of War" Myth

The "weapon of war" myth has long been part of the gun-control narrative against "assault weapons." Barbara Lautman, a spokesperson for Handgun Control Inc. (now the Brady Center to Prevent Gun Violence) said in 1989 that "[w]e don't see any reason why a private citizen needs access to a weapon designed solely for combat. These are weapons of war."²⁹ Senator Charles Schumer (D-NY), an ardent gun-control advocate, chaired the House Subcommittee on Crime and Criminal Justice in April 1994 when it held hearings on the proposed federal "assault weapons" ban. In his opening statement, he asked, "We are here today to consider one simple question--do weapons of war, weapons solely designed to kill people on the battlefield, belong on America's streets?"³⁰

When expiration of the federal "assault weapons" ban approached in 2004, Senator Christopher Dodd (D-CT), another gun-control congressman, called for renewal of the ban. "[A]ssault weapons are weapons of war ... *200 designed with one purpose in mind--for slaughtering human beings over a wide area," he declared, "[t]hey belong on a faraway battlefield, not on our Nation's streets."³¹ The Brady Center to Prevent Gun Violence released a publication in 2008 entitled *Assault Weapons: "Mass Produced Mayhem,"* which describes "assault weapons" four separate times as "weapons of war."³² The Law Center to Prevent Gun Violence (now the Giffords Law Center to Prevent Gun Violence) published a "fact sheet" in 2012 containing a picture of an AR-15 and asserting that "[w]eapons of war like these don't belong in the hands of civilians."³³

Both legislative bodies and courts have adopted this rhetoric. The District of Columbia Council banned "assault weapons" after concluding that they are "military-style weapons of war, made for offensive military use."³⁴ The *Kolbe* court labeled civilian AR-15s "exceptionally lethal weapons of war"³⁵ that are designed "to kill or disable the enemy on the battlefield."³⁶ Such descriptions are used to reinforce the legitimacy of "assault weapon" bans by characterizing the banned weapons as only having military utility.

1. Civilian use of "weapons of war"

The "weapons of war" refrain may be useful rhetoric, but it's not fact. One flaw is that small arms such as long guns and handguns have never been nicely separated into distinct categories of "military firearms" designed for the battlefield and "civilian firearms" designed for hunting, target shooting, or self-defense. Historically, most popular civilian firearms were designed for military use.³⁷ Civilians have been buying and using "weapons of war" since musket days, with little if any significant differences between military and civilian versions of these firearms.

Take rifles, for example. American militiamen originally fought with the rifles they brought from home. As *Heller* recognizes, "[i]n the colonial and revolutionary era, [small arms] weapons used by militiamen and *201 weapons used in defense of person and home were one and the same."³⁸ The repeating rifles that first debuted in the Civil War evolved into the lever action rifles used by soldiers and civilians alike in the Old West, such as the iconic Winchester Model 1873.³⁹ Like the modern AR-15, these rifles had higher ammunition capacity and more rapid rates of fire than their predecessors. Lever-action rifles manufactured by Winchester, Henry, and Marlin are still popular among hunters today.⁴⁰ The Remington Model 30 bolt-action sporting rifle, first sold commercially in 1921, was derived from the M1917 Enfield rifle used by American soldiers in World War I.⁴¹ The semiautomatic M1 Garand rifle and M1 carbine were designed for military use in World War II, Korea, and Vietnam. Civilian versions are sold commercially for target shooting and hunting, and military surplus versions are available to qualified rifle clubs

for competitive matches through the federal government's Civilian Marksmanship Program.⁴² The Remington Model 700 is a classic civilian bolt-action rifle that has been used by the U.S. Army and Marines as sniper rifles in the M24 and M40 versions.⁴³

Soldiers and civilians also use the same handguns and shotguns. Popular civilian handguns such as the iconic Browning-designed 1911, the Beretta 92 FS, and the Sig Sauer P226 were all designed for and used by the United States military.⁴⁴ The Glock 17, probably the most popular civilian handgun in the world today, initially was designed for the Austrian military *202 and police.⁴⁵ The bestselling gun in Remington Arms history, the Remington 870 pump-action shotgun, is commonly used by civilians for self-defense and hunting as well as by militaries and law enforcement agencies worldwide.⁴⁶ The Benelli M4 semiautomatic shotgun was designed for the military, but is sold in the civilian market.⁴⁷ Mossberg 500 and 590 pump-action shotguns also are used by the military and civilians alike.⁴⁸

None of this should be surprising. War often drives more effective firearm designs, and civilian small arms typically incorporate advances in military weapon technology. Private citizens historically have owned guns identical or similar to military weapons because they were readily available in the civilian market. Of course, such advances have produced more lethal firearms. But lethality is a core function of a firearm, and users typically want the most effective weapon possible, whether on the battlefield, while hunting, or in lawful defense of self and others. Both military and civilian small arms have represented the state-of-the-art technology of the day. The flintlocks of the Revolutionary War, the repeaters of the Civil War, the lever-action rifles of the Old West, the bolt-action rifles of World War I, and the semiautomatic rifles of World War II all were "weapons of war" used by civilians.

Military small arms do not lose their Second Amendment protection when possessed by civilians. The Supreme Court has never held that firearms are constitutionally-protected only if they are not "weapons of war"--in fact, it's just the opposite. In *United States v. Miller*, the Court recognized that citizens have the right to possess weapons that are part of the militia's "ordinary military equipment" or that "could contribute to the common defense."⁴⁹ That equipment, *Miller* explains, comprises those "arms supplied by themselves and of the kind in common use at the time."⁵⁰ The Court could not conclude that the Second Amendment protects possession of a short-barreled shotgun because there was no evidence that its possession or use had *203 "some reasonable relationship to the preservation or efficiency of a well regulated militia."⁵¹

The Supreme Court in *Heller* rejected a narrow reading of *Miller* that protects "only those weapons useful in warfare"⁵² and clarified that the "ordinary military equipment" referenced in *Miller* includes civilian small arms commonly used for lawful purposes such as self-defense.⁵³ *Heller* thus recognizes that the Second Amendment protects not only small arms useful in warfare, but also firearms "typically possessed by law-abiding citizens for lawful purposes."⁵⁴ Taken together, *Miller* and *Heller* stand for the proposition that the Second Amendment protects certain small arms with military utility, but that protection extends beyond those weapons to civilian weapons "in common use."⁵⁵ Both history and precedent show that one aim of the Second Amendment was to ensure that "weapons of war" would be in the hands of ordinary citizens. Even under the narrower view of the Second Amendment taken by the *Heller* dissenters, civilian-owned rifles and handguns of military utility are still protected arms.⁵⁶ If the Second Amendment protects "only a right to possess and use firearms in connection with service in a state-organized militia,"⁵⁷ as the dissenters urged, then civilians must be able to own, shoot, and train with "weapons of war."⁵⁸

2. The AR-15 as a "weapon of war"

The "weapons of war" refrain also is problematic when applied to the modern AR-15 rifle. Any rifle can be used in war, but certain rifles are made exclusively for combat applications. The United States military has never *204 used the semiautomatic-only AR-15 for combat. Its standard infantry rifles are the M16 rifle and the smaller M4 carbine.⁵⁹ These rifles are "select" or "selective" fire weapons, meaning they can be fired either in semiautomatic mode or fully automatic mode (or three-round

burst mode, depending on the model) by toggling a selector switch on the side of the rifle.⁶⁰ A fully automatic weapon fires continuously so long as the shooter presses and holds the trigger.⁶¹ By contrast, a semiautomatic firearm fires one bullet (or “round”) for each pull of the trigger.⁶² The Supreme Court in *Staples v. United States* described the basic difference between the AR-15 and the M16: “The AR-15 is the civilian version of the military’s M-16 rifle, and is, unless modified, a semiautomatic weapon. The M-16, in contrast, is a selective fire rifle that allows the operator, by rotating a selector switch, to choose semiautomatic or automatic fire.”⁶³

Kolbe correctly recognizes the distinction between semiautomatic AR-15s and the military’s fully automatic rifles,⁶⁴ but declares that “[t]he difference between the fully automatic and semiautomatic versions of those firearms is *slight*.”⁶⁵ It goes on to label civilian AR-15s as “exceptionally lethal weapons of war”⁶⁶ that are designed “to kill or disable the enemy on the battlefield.”⁶⁷ They do that by functioning like machine guns. “[L]ike their fully automatic counterparts,” *Kolbe* says, “the banned assault weapons ‘are firearms designed for the battlefield, for the soldier to be able to shoot a *205 large number of rounds across a battlefield at a high rate of speed.’”⁶⁸ *Heller II* similarly concludes that “it is difficult to draw meaningful distinctions between the AR-15 and M-16.”⁶⁹

These are myths, not facts. To begin with, federal law treats fully automatic firearms (i.e., machine guns) very differently than semiautomatic firearms like the AR-15. Civilian ownership of machine guns is extensively regulated under the National Firearms Act of 1934 (NFA).⁷⁰ Federal law prohibits the possession by private citizens of any machine gun that was not registered under the NFA by May 19, 1986.⁷¹ The effect of this law is to create a de facto ban on private ownership or transfer of machine guns made after 1986. Distinguishing the “generally ‘dangerous’ character of all guns,” Justice Ginsburg pointed out in her concurring opinion in *Staples* that “[t]he Nation’s legislators chose to place under a registration requirement only a very limited class of firearms, those they considered especially dangerous.”⁷²

The Fifth Circuit explained in *United States v. Kirk* that “[t]he firepower of a machine gun puts it in a quite different category from the handguns, shotguns, and rifles so popular with sportsmen. Its continuous fire puts the machine gun on a different plane from the semi-automatic.”⁷³ *Kolbe* fails to identify any national military force that uses the AR-15 or other semiautomatic-only rifle as its standard service rifle, nor could it. No military in the world uses a service rifle that is semiautomatic only.⁷⁴ Harold Johnson, a firearms expert, 20-year Marine veteran, and author of the Defense Intelligence Agency’s *Small Arms Identification and Operation Guide--Eurasian Communist Countries*,⁷⁵ explained in a 2009 affidavit filed in *Heller II*:

*206 Although firearm models used by military forces throughout the world have undergone design changes since [*Small Arms Identification*] was published, it remains the case that today’s military forces throughout the world continue to utilize selective-fire rifles as their standard services rifles. They have done so since the end of World War II, and will continue to do so for the foreseeable future. Semiautomatic rifles, including all those designated by the D.C. Code as “assault weapons,” are not made or designed for offensive military use. They are not used as service rifles by any military force in the world, nor are they preferred by irregular forces or terrorists None of these [“assault weapons”] are designed for offensive military use and none are known to be issued to any military force in the world.⁷⁶

That is why the Supreme Court in *Staples* used a descriptor that accurately differentiates the AR-15: it is the *civilian* version of the M16 rifle.⁷⁷ The AR-15 is not a “weapon of war” and never has been.

The capability to fire in fully automatic mode is a uniquely-military feature. Military designers during World War II recognized the need for an infantry weapon that combined the accuracy and power of a rifle with the lighter weight and automatic fire

of a submachine gun. Most soldiers at the time were equipped with heavy and cumbersome semiautomatic-only "battle rifles" that delivered large caliber rounds with great energy at effective ranges of 500 yards and beyond, while some soldiers used submachine guns firing low-powered pistol rounds that lost effectiveness beyond 100-150 yards. The modern "assault rifle" was developed to bridge this gap. It is a selective-fire weapon that fires intermediate-size rifle rounds powerful enough to be effective at the ranges useful for most modern warfare applications, but small enough to produce lower recoil for controllable automatic fire.⁷⁸

German engineers produced the first true "assault rifle" in 1943, the Stürmgewehr ("storm rifle") MP43/44 and StG 44, which fired a shorter, less powerful rifle round (7.92x 33mm) in full automatic mode, had a 16.5-inch barrel, and came equipped with a 30-round magazine. The Soviet Union developed its own fully automatic, lightweight assault rifle in 1947, the *207 Avtomat Kalashnikova, or AK-47. American designers were late to the assault-rifle race, but eventually produced the AR-15 assault rifle in the late 1950s and early 1960s.⁷⁹ Compared to the M1 Garand used in World War II and Korea, the AR-15 was almost three pounds lighter, had less recoil, used a 30-round magazine rather than an eight-round clip, could fire 12-rounds per second on full automatic rather than just single shots, and its small .22-caliber cartridge weighed less than the Army's .30-caliber rounds, allowing troops to carry more ammunition.⁸⁰

Kolbe discusses the military development of the AR-15, but the military AR-15 was not the same rifle as the modern civilian AR-15. The initial AR-15 prototype was designed, as *Kolbe* recognizes, "as a selective-fire rifle,"⁸¹ offering both semiautomatic and fully automatic modes, and it was only later that the military changed its name from AR-15 to M16. Thus, the AR-15 rifle "designed for the battlefield" was a selective-fire rifle that could shoot one round at a time or many rounds with one sustained squeeze of the trigger. The military version of the AR-15, which became the M16, always has been selective fire, whereas the civilian AR-15 always has been semiautomatic only. Because the AR-15 lacks the fully automatic capabilities of its military counterpart, it was designed not for the battlefield but rather for the civilian market.

To determine whether the AR-15 is a weapon of war "like" the M16, one must consider the two rifles' intended applications. There is a reason why no military in the world uses a semiautomatic-only rifle as its standard service weapon. Certain tactical conditions may require automatic fire, making selective-fire assault rifles superior for military use over semiautomatic-only rifles like the civilian AR-15. The 2008 United States Army Field Manual on Rifle Marksmanship explains that "[i]n some combat situations, the use of automatic or burst fire can improve survivability and enhance mission accomplishment."⁸² Automatic rifle fire can be used for *208 gaining initial fire superiority over an enemy force, suppressive fire, engaging area targets, breaking contact in close terrain, effecting ambushes, executing certain close-quarters-battle (CQB) situations such as clearing a room or bunker, engaging closely-spaced multiple targets, and providing final protective fire (FPF) against an overwhelming enemy attack.⁸³ Sometimes the military's need to fire many rounds downrange quickly is more important than precisely-aimed fire. By contrast, the inability of the AR-15 to fire in fully automatic mode makes it best-suited for civilian rather than military use. Full-automatic capability is not available on civilian AR-15s because there is typically no need for automatic fire in civilian self-defense and sporting applications.

When measured by intended applications, the AR-15 is not a weapon of war "like" the M16. Both the AR-15 and the M16 can fire in semiautomatic mode used in the vast majority of military applications, but only the M16 can fire in the fully automatic mode required for certain exceptional military operations.⁸⁴ The civilian AR-15 is neither designed nor suited for such applications. That is why the military does not use the civilian AR-15 on the battlefield. Dennis Chapman, an attorney, 25-year military veteran, and former infantry officer, points out that selective-fire capability "is the single, essential feature that makes a military firearm more useful in combat than its civilian counterpart."⁸⁵

Kolbe never explains how the semiautomatic AR-15 can be a weapon "designed for the battlefield" and "most useful in military service" when it lacks the capability for military applications requiring automatic fire. Instead, *Kolbe* downplays this distinction by asserting that any difference between the fully automatic M16 and the semiautomatic AR-15 is "slight."⁸⁶ It confidently

declares that the AR-15's semiautomatic rate of fire is "nearly identical" to the M16's fully automatic fire and that the AR-15 has the same "military features ... that make the M16 a devastating and lethal weapon of war."⁸⁷ As discussed in the two myths that follow, the AR-15's rate of fire *209 is comparable to semiautomatic handguns, not machine guns, and its "military features" typically address ergonomics and safety in a way common to most civilian rifles--they do not make the AR-15 far more dangerous than other firearms. *Kolbe* identifies one additional point of comparison: "in many situations, the semiautomatic fire of an AR-15 is more accurate and lethal than the automatic fire of an M16."⁸⁸ No one disputes that semiautomatic fire is more accurate and typically preferred over fully automatic fire (the M16 also fires in semiautomatic mode), but this is a red herring. The AR-15's semiautomatic fire capability does not offset its lack of fully automatic fire capability.

If the AR-15 and M16 are virtually interchangeable "weapons of war," as *Kolbe* contends, one wonders why the military uses more complex selective-fire weapons when cheaper, simpler AR-15s will do. The Fourth Circuit twice cited with approval the *Kolbe* district court's finding that "assault rifles like the AR-15 are essentially the functional equivalent of M-16s--and arguably more effective"⁸⁹ Neither the Fourth Circuit nor the district court explained how a weapon capable of *only* semiautomatic fire can be more effective on the battlefield than a selective-fire weapon, which has the capability for *both* semiautomatic and fully automatic fire. These judges apparently think our military is using inferior assault rifles and instead should supply its troops with weapons purchased from local gun stores.

Kolbe's deliberate disregard for the military's exclusive use of selective-fire assault rifles cannot be reconciled with its own "military use" test for Second Amendment protection. When the dissenters pointed out that the military does not use semiautomatic-only rifles, the Fourth Circuit majority responded that the relevant inquiry is not whether a weapon is used by a military, but whether it is "most useful in military service."⁹⁰ That distinction makes little sense--the military will use the weapon it determines to be most useful in military service. The military has decided that selective-fire M16 and M4 rifles are most useful in war, not the less-capable AR-15.

Faced with the lack of evidence that the civilian AR-15 is a "weapon of war" by design or function, the Fourth Circuit simply made that evidence up. Three times *Kolbe* describes the civilian AR-15 as being designed to kill or *210 disable the enemy on the battlefield, citing a 1989 ATF report at page 735 in the joint appendix:

The AR-15, semiautomatic AK-47, and other assault weapons banned by the [Maryland act] have a number of features designed to achieve their principal purpose--"killing or disabling the enemy" on the battlefield. See J.A. 735⁹¹

Whatever their other potential uses--including self defense--the AR-15, other assault weapons, and large-capacity magazines prohibited by the [Maryland act] are unquestionably most useful in military service. That is, the banned assault weapons are designed to "kill[] or disabl[e] the enemy" on the battlefield. See J.A. 735⁹²

[T]he issue is whether the banned assault weapons ... possess an amalgam of features that render those weapons and magazines like M16s and most useful in military service. The uncontroverted evidence here is that they do. See, e.g., J.A. 735 ... (reflecting that the banned assault weapons are designed to "kill [] or disabl[e] the enemy" on the battlefield)⁹³

The quoted words in the joint appendix come from this sentence in the 1989 ATF report: "The modern military assault rifle, such as the U.S. M16, German G3, Belgian FN/FAL, and Soviet AK47, is a weapon designed for killing or disabling the enemy."⁹⁴

The same report makes clear that a civilian AR-15 is not a “modern military assault rifle” because it lacks fully automatic capability.⁹⁵ The *Kolbe* majority took part of a sentence describing the design of the fully automatic military assault rifle and used it repeatedly to describe the semiautomatic-only civilian AR-15, without acknowledging or explaining the discrepancy.

The civilian AR-15 is not a “weapon of war” like the M16. Despite *Kolbe’s* claim that it is “most useful for military service,” it has never been used in war by the United States military and is not currently in use by any national military as a standard service rifle. The civilian AR-15 is not “designed for the battlefield” because it lacks the capability for fully automatic fire useful in certain combat applications. Because the civilian AR-15 is incapable of performing those applications, it is not “like” the selective-fire M16.

*211 By trying to make the civilian AR-15 appear “like” a machine gun, the Fourth Circuit neglected a more appropriate comparison: there is no significant difference in combat effectiveness between the military M16 and the civilian AR-15 when both are fired in semiautomatic mode.⁹⁶ But the Fourth Circuit’s legal argument for why the AR-15 is not protected under the Second Amendment turns entirely on there being no meaningful difference between the AR-15 when fired in *semiautomatic* mode and the M16 when fired in *fully automatic* mode. Comparing the two rifles when fired in semiautomatic mode obscures the critical difference between them: the M16 is a machine gun, while the AR-15 is not. *Kolbe* thus must compare the AR-15 in semiautomatic mode to the M16 in fully automatic mode for its argument to work. That is why *Kolbe* asserts that the AR-15’s rate of fire is “nearly identical” to the M16 in automatic mode⁹⁷ and that AR-15s “are firearms designed ... to shoot a large number of rounds across a battlefield *at a high rate of speed*.”⁹⁸ That also is why *Kolbe* compares the two rifles’ “combat features,” which it says give the AR-15 a lethal capability “far beyond” that of other firearms.⁹⁹ The correctness of these comparisons are discussed in the next two myths.

B. The “Spray Fire” Myth

A second myth propagated by gun-control advocates and relied on by courts is that the semiautomatic AR-15 is designed to “spray” a high volume of bullets almost as rapidly as a machine gun, typically without aiming. This myth is associated with mistaken or misleading assertions about the AR-15’s design and rate of fire, as well as certain “combat features” the AR-15 has in common with the M16, such as a “barrel shroud” and pistol grip, both of which are said to enable “spray firing” from the hip. The AR-15’s comparative rate of fire is discussed here, while the barrel shroud and pistol grip features are addressed in the third myth.

“Spray fire” imagery repeatedly is used by advocates of “assault weapons” bans. As discussed above, this is part of their strategy to exploit confusion surrounding “assault weapons” and make courts, lawmakers, and the public think that such weapons operate like machine guns and are therefore more dangerous than other rifles.¹⁰⁰ For example, the Council on Scientific Affairs of the American Medical Association called for a ban on “assault weapons” in 1994, asserting that “[s]emiautomatic hunting rifles are precisely aimed and fired from the shoulder, while assault weapons are meant *212 to be spray-fired from the hip.”¹⁰¹ According to a 2003 Violence Policy Center report calling semiautomatic AR-15s “bullet hoses,”¹⁰² both military *and* civilian “assault weapons” were developed specifically for the purpose of “spray and pray” firing:

From the STG-44 “storm gun” [a selective-fire military assault rifle] to the Bushmaster XM-15 [a semiautomatic-only civilian AR-15 style rifle], assault weapons have incorporated into their design *specific* features that enable shooters to spray (“hose down”) a large number of bullets over a broad killing zone, without having to aim at each individual target. These features not only give assault weapons a distinctive appearance, they make it easy to simply point the gun while rapidly pulling the trigger—including firing from the hip, a procedure seldom used in hunting anything but human beings ... “spray and pray” was exactly the point of developing assault weapons.¹⁰³

The Legal Community Against Violence (now the Giffords Law Center to Prevent Gun Violence) declared in 2004 that “[a]ssault weapons are semi-automatic firearms designed with military features to allow rapid and accurate spray firing. They are not designed for ‘sport;’ they are designed to kill humans quickly and efficiently.”¹⁰⁴ The organization further claimed that “assault weapons” are designed to “mak[e] spray firing easy”¹⁰⁵ and have the ability “to spray large amounts of ammunition rapidly and accurately.”¹⁰⁶ These are only a few examples. The “spray fire” canard has been repeated so often that it has become a cliché among pro-ban advocates.

Courts readily have accepted the “spray fire” myth as fact, despite it being both counterintuitive and unsupported by reliable evidence. The Seventh Circuit in *Friedman*, without citation, described the banned “assault weapons” as being “designed to spray fire rather than to be aimed carefully.”¹⁰⁷ In *Heller II* the D.C. Circuit credited the statement of Brian *213 Siebel, a gun-control advocate, that “assault weapons” are capable of spray-firing:

The [District of Columbia] Committee on Public Safety relied upon a report by the ATF, which described assault weapons as creating “mass produced mayhem.” *Assault Weapons Profile* 19 (1994). This description is elaborated in the Siebel testimony for the Brady Center: “the military features of semiautomatic assault weapons are designed to enhance their capacity to shoot multiple human targets very rapidly” and “[p]istol grips on assault rifles help stabilize the weapon during rapid fire and allow the shooter to spray-fire from the hip position.”¹⁰⁸

Again, this is myth, not fact. High-volume “spray fire” historically has been associated with the design and function of modern selective-fire military assault rifles and not with semiautomatic-only military rifles such as the M1 Garand and civilian rifles such as the AR-15. If the military’s semiautomatic-only rifles could produce high-volume “spray fire,” then development of the modern selective-fire assault rifle with fully automatic capability would have been unnecessary. Pro-ban supporters have created this “spray fire” myth by falsely attributing to the semiautomatic AR-15 a function exclusive to the selective-fire M16. No military documents or historical accounts of the development of modern military assault rifles describe semiautomatic-only rifles (or the M16 in semiautomatic mode) as having the design or capability to “spray” bullets on the battlefield.

“Spray and pray” was not the point of developing “assault weapons,” as the Violence Policy Center (VPC) falsely claimed.¹⁰⁹ The term “spray and pray” originally described a method of fire employed in Vietnam that *abused* the M16’s fully automatic capability. The M16 was effective in producing a large volume of fire over shorter distances.¹¹⁰ But fully automatic point shooting in combat quickly became undisciplined “spray and pray” fire for inexperienced American riflemen.¹¹¹ “Aimed fire was seldom used. Volume *214 automatic fire became the rule. Typically, soldiers sprayed bullets at the enemy in hopes that *some* of the rounds would hit him. More often than not, they *all* missed.”¹¹² The “spray and pray” method of fire was extremely inaccurate, wasted ammunition, and led to weapon malfunctions.¹¹³ There is no reason to design a firearm for “spray and pray” gunfire.

1. Comparative rates of fire: Semiautomatic handgun, AR-15, and M16

Because the AR-15 and other “assault weapons” do not fire in fully automatic mode like the M16, they do not have such “spray fire” capability. *Heller II*, however, declares that “semi-automatics ... fire almost as rapidly as automatics,” citing Siebel’s testimony that a 30-round magazine from an UZI assault pistol “was emptied in slightly less than two seconds on full automatic, while the same magazine was emptied in just five seconds on semi-automatic.”¹¹⁴ *Kolbe* similarly compares rates of fire of the M16 and AR-15:

[T]he automatic firing of all the ammunition in a large-capacity thirty-round magazine takes about two seconds, whereas a semiautomatic rifle can empty the same magazine in as little as five seconds. See, e.g., J.A. 1120 (“[S]emiautomatic weapons can be fired at rates of 300 to 500 rounds per minute, making them virtually indistinguishable in practical effect from machine guns.”)¹¹⁵

Although an M16 rifle is capable of fully automatic fire and the AR-15 is limited to semiautomatic fire, their rates of fire (two seconds and as little as five seconds, respectively, to empty a thirty-round magazine) are nearly identical.¹¹⁶

***215** Before examining the accuracy of these claims, it is necessary to establish a baseline for comparing rates of fire. That baseline is the semiautomatic handgun, which *Heller* recognizes as a firearm protected by the Second Amendment. Semiautomatic handguns and semiautomatic rifles operate the same way: one round fired for each trigger pull with automatic loading of the next round. The average shooter can fire a semiautomatic handgun at a rate of about 2-3 rounds per second while pointing at a single stationary target. A Force Science Research Center 2007 study on police-attacker shooting performance showed that a large majority of inexperienced handgun shooters in the test group could fire three rounds from a semiautomatic handgun in 1.5 seconds (2 rounds per second), and some were able to fire three rounds in one second.¹¹⁷ In *Rampage Nation: Securing America from Mass Shootings*, Louis Klarevas says the average shooter's rate of fire for a semiautomatic handgun is two rounds per second, while the expert shooter can fire three rounds per second.¹¹⁸ As shown below, the rate of fire for semiautomatic AR-15 rifle is nearly identical to the semiautomatic handgun. If AR-15s are capable of “spray firing,” then so are the handguns protected by *Heller*.¹¹⁹

Determining comparative rates of fire is more complicated than federal court decisions suggest. There are two ways to measure a weapon's rate of fire. One method measures the total time from the first shot to the last shot, breaking that time into “splits” or time intervals between each shot. This typically is used when measuring cyclic (mechanical) rate of fire. The other ***216** method adds the shooter's reaction time, which is the time interval between the shooter hearing the start signal and firing the first round. The latter method provides a more realistic measurement for real-world scenarios.

With a cyclic (mechanical) rate of fire of 700-900 rounds per minute in full automatic mode,¹²⁰ an M16 can empty a standard 30-round magazine in 2 to 2.5 seconds. But the M16's cyclic rate of fire becomes theoretical after the first magazine is emptied. It does not account for magazine changes to reload or the fact that firing multiple rounds without pause will cause the barrel to overheat. To fire that rapidly over a sustained period, the shooter would have to reload every two seconds, which would add another two-to-five seconds per 30-round magazine, depending on the shooter's proficiency.¹²¹ Additionally, because the M16's barrel is not intended for sustained fully automatic fire, it will overheat and eventually rupture around 500 rounds.¹²²

Federal court claims that the semiautomatic AR-15 is capable of high rates of fire “almost as rapid”¹²³ or “nearly identical”¹²⁴ to the fully automatic M16 are inaccurate. *Kolbe* cites evidence that “semiautomatic weapons can be fired at rates of 300 to 500 rounds per minute, making them virtually indistinguishable in practical effect from machine guns.”¹²⁵ Aside from the fact that *Kolbe*'s data indicates that semiautomatics fire at only half the rate of fully automatics, anyone familiar with the operation of the civilian AR-15 knows that it does not fire 300 to 500 rounds per minute. To begin with, a cyclic rate of fire for a semiautomatic firearm is meaningless. Because a semiautomatic firearm fires only one round with each pull of the trigger, it can fire only as fast as the individual shooter can pull the trigger. How fast the shooter can pull the trigger will depend on the shooter's skill and endurance as well as the weapon's firing mechanism (weight of trigger pull, trigger reset distance, buffer spring, etc.). Even if a shooter can fire multiple ***217** rounds in a single second, that does not mean he or she can maintain that rate of fire for

a longer period. To fire 300 to 500 rounds per minute, a shooter would have to pull the trigger five to eight times *a second* for 60 seconds. The shooter also would need to reload, which adds an additional two to five seconds (or more, depending on proficiency) for each magazine used.

To further show that a semiautomatic AR-15 fires almost as rapidly as the fully automatic M16, both *Kolbe* and *Heller II* declare that a semiautomatic rifle can empty a 30-round magazine "in as little as five seconds."¹²⁶ While *Kolbe* sourced this assertion with the flawed "300 to 500 rounds per minute" figure,¹²⁷ the D.C. Circuit in *Heller II* relied on a statement from gun-control advocate Brian J. Siebel, who made the "five seconds" claim:

Although semi-automatic firearms, unlike automatic M-16s, fire "only one shot with each pull of the trigger," ... semi-automatics still fire almost as rapidly as automatics. *See* Testimony of Brian J. Siebel, Brady Center to Prevent Gun Violence, at 1 (Oct. 1, 2008) ("30-round magazine" of UZI "was emptied in slightly less than two seconds on full automatic, while the same magazine was emptied in just five seconds on semi-automatic"). Indeed, it is difficult to draw meaningful distinctions between the AR-15 and the M-16.¹²⁸

You can empty a 30-round magazine on a semiautomatic AR-15 in five seconds--if you are Jerry Miculek. Many consider Miculek to be the world's fastest shooter.¹²⁹ He has fired five rounds from an AR-15 in .96 seconds and emptied a 30-round magazine with an AR-15 in 5.3 seconds.¹³⁰ If you are not Jerry Miculek, it will take longer. I asked Jeff Gurwitch, a Special Forces veteran, firearms expert, and competitive shooter, to see how fast he could empty a 30-round magazine using a semiautomatic AR-15. It took him *218 6.4 seconds.¹³¹ Being an avid civilian shooter, I have fired thousands of rounds through an AR-15. My best time was slower at almost seven seconds.¹³²

These rates of fire are not "nearly identical" to an M16 firing in automatic mode. Adding half-a-second reaction time to the cyclic rate, a fully automatic M16 can empty a 30-round magazine in 2.5 seconds, which is 12 rounds per second.¹³³ By contrast, only the world's fastest shooters can empty a 30-round magazine in "as little as five seconds," which is twice as slow as the M16. The average shooter likely will take at least eight-to-ten seconds to empty a 30-round magazine with an AR-15, which is almost four times slower than the M16.¹³⁴ Few shooters will retain that rate of fire for an entire minute, probably slowing closer to one or two rounds per second at the end. The rate for an inexperienced shooter will be even less.

Such rates of fire, of course, do not occur in real-world situations. Besides reloading, the shooter will be aiming at a target or multiple targets that likely are moving and the weapon's accuracy will be affected as recoil impulses move the barrel upwards after each shot. Dave Kopel rightly has pointed out that "the only meaningful rate of fire for a weapon is how fast a person, shooting at actual targets, can hit those targets."¹³⁵ Automatic fire is notoriously inaccurate. That is why the military specifies that the maximum *effective* rate of fire for an M16/M4 in fully automatic mode is 150-200 rounds per minute, even though its cyclic rate is five times higher.¹³⁶ Rapid semiautomatic fire likewise can be inaccurate. The military's maximum *effective* rate of fire for an M16/M4 in semiautomatic mode is only 45 rounds per minute, about four times slower the fully automatic rate.¹³⁷ Accurate semiautomatic fire thus results in only about four rounds in five seconds, not *219 30 rounds as *Kolbe* claims. Additionally, the maximum *sustained* rate of fire for the M4/M16--the rate at which the weapon can continue to be fired indefinitely without overheating--is even lower at 12-15 rounds per minute.¹³⁸ Even with sustained suppressive fire, military training is designed to produce rapid semiautomatic fire that "will result in a well-aimed shot every one or two seconds."¹³⁹ Citing several expert declarations in *Robertson v. Denver*,¹⁴⁰ Kopel notes that "[i]t is nearly impossible for even trained shooters to fire on a target at much faster than one shot per second."¹⁴¹

Even if *Kolbe's* "nearly identical" claim is understood as proximate rather than proportional--that is, the rates of fire are "nearly identical" because they differ only by a few seconds--the attempt to favorably compare the semiautomatic AR-15 with the fully automatic M16 still fails. Using semiautomatic handguns as a baseline, the rate of fire for the AR-15 is "nearly identical" to the handgun, not the M16. As previously noted, the Force Science Research Center study showed that inexperienced shooters could fire two-to-three rounds per second from a semiautomatic handgun at a single stationary target.¹⁴² My own testing showed that I was able to fire three rounds from a semiautomatic handgun in .93 seconds and to empty a 15-round magazine in 3.9 seconds.¹⁴³ That rate is less than a second longer than it took me to empty a 30-round magazine with my AR-15. Louis Klarevas in *Rampage Nation: Securing America from Mass Shootings* sets the average shooter's rates of fire for a semiautomatic handgun and semiautomatic "assault rifle" at an identical two rounds per second, while the expert shooter can fire both weapons at three rounds per second.¹⁴⁴ Well-aimed fire at multiple targets will be even slower. The AR-15 is no more dangerous in its rate of fire than the vast majority of handguns.

Further evidence that "assault weapons" have not been used in real-life for achieving rates of fire comparable to fully automatic weapons comes from a *New York Times* article comparing audio recordings of the Las Vegas shooting, the Pulse nightclub shooting in Orlando, and the firing of a pre-1986 fully automatic Colt AR-15.¹⁴⁵ During the periods captured in the three audio recordings, the Orlando shooter fires 24 shots in nine seconds, the Las Vegas shooter fires 90 shots in ten seconds, and a fully automatic weapon *220 fires 98 shots in seven seconds.¹⁴⁶ The Orlando shooter fired at a rate of 2.7 rounds per second during the recording, which is comparable to the rate-of-fire results for AR-15s and semiautomatic handguns described above.¹⁴⁷ By contrast, the Las Vegas shooter, apparently assisted by a bump-fire stock, fired at a rate of 9 rounds per second, and the fully automatic rifle fired at an even higher rate of 14 rounds per second.

Some may argue that semiautomatic rates of fire are irrelevant when add-ons like bump stocks or trigger cranks can increase the AR-15's rate of fire almost to the fully automatic rate. Until the tragic mass shooting in Las Vegas in September 2017, such devices had not been used in any mass shooting, and there is no evidence that they play any significant part in gun crimes. They are not used by the military or law enforcement, they are notoriously inaccurate and prone to misfiring, and they are not particularly useful for target shooting or self-defense. Since they are accessories and not part of the AR-15's original configuration, they can be regulated or banned separately.¹⁴⁸ The whole point of these devices is to make the semiautomatic AR-15 fire almost as rapidly as the fully automatic M16. If the two weapons' rates of fire are "nearly identical," as *Kolbe* claims,¹⁴⁹ these devices would be unnecessary.

The attempt by *Kolbe* and *Heller II* to depict "assault weapons" as having rates of fire virtually indistinguishable from fully automatic military assault rifles is both counterintuitive and lacks any reliable evidentiary support. The AR-15 does not "spray" rounds like the fully automatic M16. Nelson Lund correctly observes that "if the rate of fire in both modes were virtually identical, one wonders why the military would bother making all of its battle rifles capable of automatic fire."¹⁵⁰ The simple fact that the M16 and M4 have two separate modes of fire--semiautomatic and fully automatic (or burst)--indicates that the rates of fire in both modes are not "nearly identical."

So where did the Fourth and D.C. Circuits get their "facts"? The Fourth Circuit's "300 to 500 rounds per minute" figure comes from the 1994 United States House of Representatives Committee on the Judiciary Report on the proposed federal "assault weapons" ban.¹⁵¹ The committee report cites earlier testimony from Dewey R. Stokes, who at the time was national president of the Fraternal Order of Police and a leading proponent of gun *221 control.¹⁵² Stokes had testified before a June 1991 House subcommittee hearing on "assault weapons," where he stated that "[a]ssault weapons dramatically escalate the firepower of the user. Some technical documents on the firing rate of these weapons is at 300 or even 500 rounds per minute."¹⁵³ Stokes neither identified nor produced those "technical documents," and there is nothing to indicate that he was a firearms expert or personally observed that rate of fire from a semiautomatic AR-15 or any other "assault weapon." The Fourth Circuit's conclusion that the

semiautomatic AR-15 has a rate of fire “nearly identical” to a fully automatic M16 was based on a single unsubstantiated claim made by a gun-control advocate 26 years ago.

Siebel's “testimony” cited by the D.C. Circuit was an unsworn statement made before the District of Columbia's Committee on Public Safety, which urged enactment of the District's “assault weapons” ban. Siebel is not a firearms expert—at the time, he was an attorney and lobbyist with the Brady Center, a gun-control advocacy group. His statement refers to an earlier police test: “When San Jose, California, police test-fired an UZI, a 30-round magazine was emptied in slightly less than two seconds on full automatic, while the same magazine was emptied in just five seconds on semiautomatic.”¹⁵⁴ This test originally was mentioned in a 1988 magazine article by Chief Joseph D. McNamara of the San Diego Police Department, also a gun-control advocate.¹⁵⁵ McNamara explained that

[a]fter a San Jose officer was shot with an Uzi, we tested it on our police firing range. Fully automatic, the weapon is illegal; it fired a 30-round clip in slightly less than two seconds. On semiautomatic, it fired the same clip *222 in five seconds. These weapons are defined as rifles and purchased legally¹⁵⁶

McNamara did not specify the model of the Uzi, nor did he provide any information about the skill of the shooter, type of timing device used (stopwatch or digital shot timer), or whether the results included reaction time;¹⁵⁷ in short, there is no way to verify the accuracy of McNamara's results. Yet the results of this one unconfirmed “test,” reported in three sentences in trade magazine almost 30 years ago, has become anti-gun advocates' oft-repeated agitprop and a key piece of evidence in federal appellate court decisions upholding broad bans on popular firearms.

2. Comparative rates of fire: Mass shootings

Other than the 2017 Las Vegas shooting, mass shooters have not used AR-15s or other “assault weapons” to produce rates of fire higher than those attainable with semiautomatic handguns in incidents for which average rates of fire can be determined. I am not suggesting that the mass shooters discussed below actually fired at the rates specified; rather, my point is that the same number of rounds could have been fired by semiautomatic handguns within the time elapsed for the shootings. Having a semiautomatic rifle rather than a semiautomatic handgun apparently did not result in any significant rate-of-fire advantage. Of course, any discussion of mass shootings solely from a rate-of-fire perspective will seem detached from the tragic loss of life involved. Such analysis must be performed, however, if courts are going to rely on rate-of-fire comparisons to reach legal conclusions about the constitutionality of “assault weapon” bans.

One of the first modern mass shooting tragedies occurred in 1989 at Cleveland Elementary School in Stockton, California. The shooter used a semiautomatic AK-47-style rifle to kill five children and injure 31 on the school playground. He fired 105 rounds during the shooting, which lasted three minutes.¹⁵⁸ According to the California Attorney General's Report on *223 the shooting, the shooter's AK-47 variant “was capable of firing those bullets at about two rounds per second.”¹⁵⁹ To fire 105 rounds in three minutes would require about 35 rounds per minute, well within the rate of fire for semiautomatic handguns.

Using an AR-15, the Newtown shooter, according to *Kolbe*, “fired at least 155 rounds within five minutes,” which tragically killed 20 first-graders and six adults.¹⁶⁰ Assuming he made five magazine changes that took five seconds each, that would be about 34 rounds per minute, again within the rate of fire for semiautomatic handguns. The Aurora movie theater shooter killed 12 and wounded at least 58 in six minutes.¹⁶¹ He fired 76 rounds total: 65 rounds from an AR-15 rifle before it jammed, six shotgun rounds (with multiple pellets per round), and five .40 caliber handgun rounds.¹⁶² Sounds of at least 30 shots can be heard in a recorded 27-second call to 911.¹⁶³ That is about one round per second, again a rate easily attainable with a semiautomatic handgun. The off-duty sheriff's deputy who used his police-issued AR-15 semiautomatic rifle to kill six and

wound one in Crandon, Wisconsin, fired 30 rounds in about one minute, also about one round every two seconds.¹⁶⁴ The Parkland school shooter reportedly fired 150 rounds in six-and-one-half minutes, killing 17 and wounding 17 more.¹⁶⁵ There are conflicting reports about whether he used 10-round or 30-round *224 magazines.¹⁶⁶ Assuming five seconds for each magazine change, that averages between 23 to 28 rounds per minute depending on magazine size, again well within the capability of a semiautomatic handgun.

Perhaps the highest rate of fire in a mass shooting occurred at the First Baptist Church in Sutherland Springs, Texas. The shooter tragically killed 26 and wounded 20, using 15 30-round magazines to fire 450 rounds in seven minutes.¹⁶⁷ The rate of fire likely was higher was due to multiple stationary victims in very close proximity to the shooter. Assuming five seconds for each magazine change, this would have reduced his total shooting time to six minutes. That results in an average rate of fire of 77 rounds a minute or 1.28 rounds per second. By comparison, a shooter with semiautomatic handgun firing two rounds per second and using standard 15-round magazines could fire about 80 rounds a minute with magazine changes.

Other mass shootings show that semiautomatic handguns can be fired at rates or volumes comparable to the “assault weapons” used in the Stockton, Newtown, Aurora, Orlando, Sutherland Springs, and Parkland shootings. Using a Glock 19 semiautomatic handgun with a 33-round magazine, the Tucson shooter fired 33 rounds in 15 seconds, some two rounds per second.¹⁶⁸ The shooter at Virginia Tech used two semiautomatic handguns, a 9mm Glock 19 and a .22 caliber Walther P22.¹⁶⁹ At the Norris Hall location, he fired 174 rounds from the two handguns in about 10 minutes, walking back and forth among classrooms while killing 30 and wounding 17.¹⁷⁰ The Fort Hood shooter used an FN 5.7 semiautomatic handgun to kill *225 13 and wound 30. He fired 214 rounds in 10 minutes.¹⁷¹ The Wisconsin church shooter fired 22 rounds from a 9mm Beretta semiautomatic handgun in less than a minute.¹⁷²

With the sole exception of the Las Vegas shooter who apparently used a bump stock, there is no evidence that any mass shooter has fired at AR-15's maximum rate of fire.¹⁷³ Criminologist Gary Kleck, whose research is cited in *Heller*,¹⁷⁴ made the following observations about mass shootings involving large-capacity magazines from 1994-2013 with known rates of fire:

In the 25 incidents for which average rates of fire could be determined, shooters never maintained an average rate of fire anywhere as fast as that at which their firearms were capable of firing. Shooters firing as fast as the gun allows can easily fire three rounds per second with a typical semiautomatic firearm, that is, with only about one third of a second between rounds. In only three incidents were mass shooters know to have averaged less than 2 s between rounds. This is no more than one sixth of the maximum rate of fire of which semiautomatic guns are capable¹⁷⁵

The three incidents Kleck identifies as having an average rate of fire of less than two seconds per shot involved one semiautomatic handgun (Tucson), one semiautomatic AR-15 (Newtown), and one semiautomatic AK-47 variant illegally modified to fire automatically (Carson City).¹⁷⁶

The claim that AR-15s are capable of “spray firing” like machine guns is myth, not fact. Accurate rate-of-fire comparisons prove false *Kolbe's* *226 assertion that the semiautomatic-only AR-15 can fire at a rate “nearly identical” to the military's fully automatic M16. The semiautomatic AR-15's rate of fire actually is much more “like” the semiautomatic handgun, which *Heller* describes as the “quintessential self-defense weapon” and a firearm protected under the Second Amendment.¹⁷⁷

C. The “combat features” myth

Another "assault weapon" myth is that the AR-15 shares certain military combat features with its M16 counterpart that make it much more lethal than other civilian firearms. This myth is reflected in "assault weapons" statutes that define the banned firearms based not on how powerfully they strike, how fast they fire, and how accurately they shoot, but rather on having certain features such as flash suppressors, barrel shrouds, folding and telescoping stocks, pistol grips, grenade launchers, night sights, bayonet lugs, and detachable magazines.¹⁷⁸

The combat features myth appears widely in pro-gun control advocacy and typically supports the "spray-fire" falsehood. For example, Brian Siebel testified before the D.C. Council that unlike hunting rifles designed for aimed fire from the shoulder, semiautomatic "assault weapons" are designed to "shoot multiple human targets very rapidly," that these weapons have pistol grips to "help stabilize the weapon during rapid fire and allow the shooter to spray-fire from the hip position," that barrel shrouds "protect the shooter's hands from the heat generated by firing many rounds in rapid succession."¹⁷⁹ Siebel summed up by claiming that "[f]ar from being simply 'cosmetic,' these features all contribute to the unique function of any assault weapon to deliver extraordinary firepower. They are uniquely military features, with no sporting purpose whatsoever."¹⁸⁰ *Heller II* relies on Siebel's testimony about these features in upholding the District's "assault weapons" ban.¹⁸¹ *Kolbe* and *New York State Rifle & Pistol Ass'n* likewise embrace the myth. According to *Kolbe*, the AR-15 and other "assault weapons" possess military features designed for combat:

*227 [S]ome of the banned assault weapons incorporate flash suppressors, which are designed to help conceal a shooter's position by dispersing muzzle flash. Others possess barrel shrouds, which enable "spray-firing" by cooling the barrel and providing the shooter a "convenient grip." Additional military features include folding and telescoping stocks, pistol grips, grenade launchers, night sights, and the ability to accept bayonets and large-capacity magazines.¹⁸²

Both *Kolbe* and *New York State Rifle & Pistol Ass'n* conclude that such features give the AR-15 a lethal capability "far beyond" that of other firearms.¹⁸³ But none of these courts seriously considered whether these claims are factual. They took decades-old statements from pro-ban advocates at face value without scrutinizing them for accuracy. They assumed when they should have examined.

Only two features from *Kolbe*'s list have strictly military applications: the grenade launcher and the bayonet mount. Neither are sold on civilian AR-15s and can be added only as accessories. Grenade launchers, such as the 40mm Colt M203, and high explosive rounds are considered "destructive devices" under the National Firearms Act (NFA) and therefore highly regulated. Assuming they are legal in the purchaser's state, they require a separate ATF registration and \$200 tax stamp for each item (i.e., the launcher and each separate round), as is required for machine guns, short-barrel rifles, and suppressors.¹⁸⁴ Few manufacturers sell 40mm grenade launchers for AR-15 rifles and they are very expensive--the launcher itself sells for around \$2000 plus the tax stamp, and each high explosive round, if you can find one for sale, sells for \$400-500 and requires a tax stamp. Manufacturers stopped affixing bayonet mounts on civilian AR-15s in the 1990s, but they still can be installed as accessories. While both features can enhance the AR-15's lethality, no one has ever used a rifle-mounted grenade launcher or bayonet to commit mass murder in the United States. Moreover, like bump stocks, if the accessory makes the rifle unusually lethal, then the state's interests in public safety can be met by regulating or banning the accessory, not the entire rifle. Banning the rifle to eliminate a single accessory is not "narrowly tailored" under heightened constitutional scrutiny.

The remaining features--flash suppressors, barrel shrouds, adjustable stocks, pistol grips, night sights, and large-capacity magazines--do not have exclusively military uses. They reflect advances in modern firearm technology that make the rifle more ergonomic and functional as a firearm in *228 both military and civilian applications. Of course, enhancing a firearm's functionality can increase its lethality, as lethality is a core function of any firearm. When presented with evidence that these features improve the AR-15's accuracy, comfort, and utility, the Second Circuit in *New York State Rifle & Pistol Ass'n* observed

that "[t]his circumlocution is ... a milder way of saying that these features make the weapons more deadly."¹⁸⁵ But how much more deadly? None of the circuits have attempted to answer that question. If they had, they would have learned that pistol grips, barrel shrouds, adjustable stocks, and flash hiders only marginally affect the AR-15's lethality, if at all. There is no evidence that such features give the AR-15 a lethal capability "far beyond" other civilian long guns.¹⁸⁶ The only feature that has the potential to make the AR-15 deadlier than other firearms is its capability to use larger capacity magazines. However, as discussed below, the lethal effect of large-capacity magazines in real-world scenarios is difficult to measure.

1. *Pistol grips*

Courts repeatedly have made the false claim that pistol grips enable spray firing from the hip. In *Richmond Boro Gun Club, Inc. v. City of New York*, a pre-Heller case challenging the constitutionality of a local ordinance banning "assault weapons," the Second Circuit observed that a pistol grip "is favored in military weapons because it aids in 'one-handed firing' at the hip level" and that the law "aims to identify those rifles whose pistol grips are designed to make such spray firing from the hip particularly easy."¹⁸⁷ *Heller II* approvingly quotes Brian Siebel's statement that "[p]istol grips on assault rifles help stabilize the weapon during rapid fire and allow the shooter to spray-fire from the hip position."¹⁸⁸ The district court in *New York State Rifle & Pistol Ass'n* noted that in defending the ban New York "points to evidence that these features aid shooters when 'spray firing' from the hip."¹⁸⁹

The pistol grip is designed to help stabilize the rifle when firing from the shoulder, not the hip. When a rifle fires, recoil from the bullet and propellant gases exiting the muzzle of the barrel moves the rifle back along *229 the centerline of the barrel. With many hunting rifles and shotguns, the centerline of the barrel is higher than the shooter's shoulder because the buttstock of the rifle is angled lower than the barrel. Recoil thus causes the barrel of the rifle to move back and up ("muzzle rise"). This effect is multiplied when using fully automatic fire, potentially causing all but the first one or two shots to go high. Selective-fire M16 rifles were designed to reduce muzzle rise by moving the buttstock in line with the barrel so that the rifle's recoil will push straight back against the shooter's shoulder.¹⁹⁰ With this straight-line design, the shooter can more quickly return to the point of aim, allowing faster follow-up shots.

The straight-line design requires a pistol grip separate from the buttstock because it is too awkward to pull the trigger while gripping the raised buttstock when firing the rifle from the shoulder, whether standing, kneeling, or prone. The Department of Defense's Advanced Research Projects Agency (ARPA), in its 1962 final report on testing of the military's AR-15/M16 in Vietnam, described the rifle as having "a plastic stock with a rubber butt, assembled in line with the bore. This, in conjunction with its high line of sight and *separate hand grip*, is designed to minimize rotation *about the shoulder* during firing."¹⁹¹ The ARPA report refers to the military AR-15/M16 six times as a "shoulder weapon."¹⁹² The pistol grip thus allows for accurate firing from the shoulder, which is how the rifle was designed to shoot.

Firing a weapon from the hip is something seen in Hollywood movies, not in firearms training courses. No competent military, law enforcement, or civilian trainer teaches people to shoot a semiautomatic rifle from the hip as the preferred method of fire.¹⁹³ Assertions by pro-ban groups and courts that AR-15 pistol grips are "designed" to give the shooter greater control with unaimed "spray-firing" from the hip are simply false. They have not produced any design report, field test, military documentation, or other impartial source to substantiate this claim--it is myth masquerading as fact. *230 A pistol grip separate from the stock does not give the shooter any ergonomic advantage when firing from the hip; in fact, holding a rifle at the hip with a pistol grip can be more difficult than with a non-pistol grip stock. The pistol grip is designed for shooting from the shoulder.

Even if the AR-15 were capable of "spray firing," gun-control advocates have not explained why anyone would want to shoot it unaimed from the hip. The AR-15 is far less accurate when fired from the hip without a backstop like the shoulder to aid in controlling recoil. Because the shooter is not aiming with the gun's sights and has less recoil control, "spray-firing" from the hip results in highly-inaccurate fire and makes the gun *less* lethal to the intended target. Professor Eugene Volokh explains:

People “spray firing” a semi-automatic from the hip are thus making themselves *less dangerous* to the people they’re shooting at (compared to normal firing when one is actually sighting down the barrel). Nor are they making it easier to fire a lot of rounds quickly; one can fire just as quickly in the normal shooting position as when firing from the hip

Another way of thinking about this is to consider a pistol--an ordinary handgun. Those pistols, unsurprisingly, have pistol grips. But only someone who is either extraordinarily skillful or pretty stupid would want to try to “spray fir[e]” a pistol from the hip. Instead, people who shoot pistols raise them up to eye level, so that they can actually aim by looking down the barrel. There’s a reason that the expression “shoot from the hip” tends to refer to actions that are less effective because they are less deliberate

[T]he concern that pistol-grip semiautomatic rifles are somehow more dangerous because they facilitate “‘spray firing’ from the hip” strikes me as a red herring. If you could wave a magic wand that makes all criminals shoot semiautomatics from the hip rather than from eye level, you’d probably save lives.¹⁹⁴

There is no evidence that the use of pistol grips makes AR-15s more lethal than other firearms. Christopher Koper, who studied the effects of the 1994-2004 federal “assault weapons” ban, observed that “it is unknown whether civilian attacks with semiautomatic rifles having pistols grips claim more victims per attack than do those with other semiautomatic rifles.”¹⁹⁵ The “spray firing from the hip” myth is just another attempt by gun-control *231 advocates to convince courts that semiautomatic AR-15 rifles are no different than military machine guns and just as dangerous.

2. *Barrel shrouds*

The conventional term for barrel shroud is “handguard.” It is the metal or plastic enclosure that covers typically all but a few inches of the barrel. The AR-15 handguard has multiple functions: (1) it provides the shooter with a forward grip on the rifle using the non-trigger hand; (2) it protects the shooter’s hand from a hot barrel; (3) it protects the barrel and gas tube or piston from damage;¹⁹⁶ (4) it helps ventilate and cool the barrel; and (5) it provides a base for attaching accessories to the rifle such as sights, slings, flashlights, forward vertical grips, and bipods. None of these functions make the AR-15 exceptionally lethal, especially when compared to non-banned rifles.

The AR-15 handguard provides a stable and safe forward grip on the rifle, but this function is common to long guns. Every long gun has a place where the shooter can grip the firearm forward of the rifle’s trigger and chamber. The AR-15 handguard works like the forward part of a wooden or synthetic stock on a bolt-action rifle or shotgun--it allows the shooter to grip the firearm with the off hand and stabilize the weapon while aiming. It also protects the shooter’s off hand from being burned by directly touching the barrel. Firing more than three or four rounds consecutively through any long gun can make the barrel too hot to touch. For safety reasons, no long gun requires the shooter to hold the barrel directly with the off hand--they all have some protective mechanism.

Kolbe says that barrel shrouds on AR-15s “enable ‘spray-firing’ by cooling the barrel and providing the shooter a ‘convenient grip.’”¹⁹⁷ One function of the AR-15 and M4/M16 handguard is to help cool the barrel. Heat buildup in the rifle barrel degrades the weapon’s accuracy. Due to barrel mass, lightweight rifles like the military M16/M4 and civilian AR-15 tolerate thermal stress less efficiently than heavier firearms. The handguard helps cool the barrel through convection cooling.¹⁹⁸ But *Kolbe* overstates

the *232 effect of handguard cooling. Such cooling does not enable rapid “spray firing.” Even with handguard cooling, military M16/4 rifles and civilian AR-15 rifles cannot be fired rapidly without loss of accuracy and potential barrel damage due to heat buildup. The maximum sustained rate of fire is the rate at which the weapon can continue to be fired indefinitely without serious overheating. For M16/M4 rifles, the military has set that rate at only 12-15 rounds *per minute*, which hardly qualifies as “spray firing.”¹⁹⁹ Handguards function mostly as ergonomic and safety devices, and only secondarily to provide some slight additional cooling to the barrel. They do not enable rapid spray firing or increase the lethality of AR-15s beyond other rifles.

3. Adjustable stocks

Adjustable stocks are ergonomic improvements over earlier fixed-stock rifle configurations. They are designed to allow adjustments in the rifle's length of pull, making the firearm more comfortable to shoot in both military and civilian applications. A telescoping stock makes a rifle easier to shoulder properly for different users, or for one user when shooting from different positions or wearing different thicknesses of clothing. The military M16 has a fixed stock, while the military M4 and the civilian AR-15 have telescoping rather than folding stocks.²⁰⁰ Adjustable stocks are ubiquitous on civilian rifles. My precision bolt-action rifle, for example, has a stock that adjusts both for length and for height of the cheek rest.

Kolbe neither identifies the combat-specific function of folding or telescoping stocks nor explains how such stocks help make the AR-15 much more lethal than other semiautomatic rifles. A firearm more comfortable to shoot may increase accuracy, but only slightly so. A telescoping stock can make the weapon somewhat easier to stow and manage in military aircraft or vehicle operations,²⁰¹ but it does not significantly increase the weapon's lethality. Switching from the fixed-stock M16 to the telescoping stock M4 did not suddenly make our soldiers far more accurate on the battlefield.

The district court in *N.Y. State Rifle & Pistol Ass'n* stated that “[f]olding and telescoping stocks aid concealability and portability.”²⁰² Daniel Webster, a professor of health policy and gun violence researcher, submitted a sworn statement in *Kolbe* asserting that folding or telescoping rifle stocks *233 “enhance a weapon's utility in carrying out criminal assaults, especially mass shootings” because they “make it easier to conceal powerful rifles.”²⁰³ Once again, this is myth, not fact. “Concealment” is not a typical combat-function with military service rifles. There is no reason to conceal infantry small arms like the M16 and M4 on the battlefield. The M16 rifle has always had a fixed stock, but that did not disqualify it as a battlefield weapon. The smaller M4 carbine uses a telescoping stock for ergonomic and storage reasons, not for concealment. Moreover, the adjustment range for telescoping stocks is small, typically about three inches. The telescoping stock on my AR-15, for example, shortens the rifle's overall length from 37 to 34 inches. A three-inch adjustment is hardly enough to make the rifle concealable for mass shootings and criminal assaults, as Webster claimed.

4. Flash hiders

Flash suppressors or hiders are attached to the end of the barrel and typically come standard on civilian AR-15s. They reduce but do not eliminate the rifle's visible signature (muzzle flash) during firing. With the M16/4 and AR-15, burning powder and reigniting hot gases create a ball of flame at the end of the muzzle. The flash hider disperses the exploding gases, helping hide the shooter's location and preserve the shooter's low-light or night vision.²⁰⁴ Some flash hiders, such as the popular A2, which comes as standard equipment on military M16/4 rifles and many civilian AR-15s, also function as a compensator that can slightly reduce vertical movement of the barrel (muzzle rise) by dispersing the gases upward and to each side.²⁰⁵

Flash suppressors do not make rifles shoot faster, fire with much greater accuracy, or impact with more power.²⁰⁶ Civilian applications for flash *234 hiders include hunting in low light or at night.²⁰⁷ Probably the greatest practical benefit of a flash hider for civilians is that it protects the crown of the barrel from dirt and other obstructions.²⁰⁸ There is no evidence that flash hiders have given terrorists or criminals any advantage in mass shootings or other crimes involving “assault weapons.” Even

pro-ban advocates agree that flash suppressors do not make AR-15s more lethal than other firearms. Calling them “bells and whistles,” the Violence Policy Center (VPC) conceded that flash suppressors “have nothing to do with why assault weapons are so deadly.”²⁰⁹

5. Magazine capacity

One feature that may give the shooter an advantage is magazine capacity. Both the military M16/M4 and the civilian AR-15 use a standard 30-round detachable magazine. This capacity is larger than standard semiautomatic handguns (15-18 rounds), bolt-action rifles (5-10 rounds), lever-action rifles (5-8 rounds), revolvers (5-6 rounds), and typical hunting shotguns (2-5 rounds).²¹⁰ Christopher Koper, in his study of the effects of the federal “assault weapons” ban, observed that “an LCM [large-capacity magazine] is arguably the most important feature of an AW [assault weapon]. Hence, use of guns with LCMs is probably more consequential than use of guns with other military-style features, such as flash hiders, folding rifle stocks, threaded barrels for attaching a silencer, and so on.”²¹¹

The ability to accept detachable magazines is not a unique military feature.²¹² Civilian semiautomatic rifles and handguns are designed to use detachable magazines, as are most modern bolt-action rifles. The critical feature is the *size* of the magazine. Since an AR-15 does not require standard 30-round magazines to function, any lethal effects of larger-capacity magazines can be addressed by banning certain-sized magazines. There are good reasons to be skeptical that magazine capacity makes a difference in *235 mass shootings,²¹³ but even if it does, the narrowly-tailored solution-- which should be required under heightened judicial scrutiny--is to ban the larger-capacity magazine rather than the entire firearm. *Kolbe's* inclusion of the ability to accept larger-capacity magazines in its list of military features disqualifying the AR-15 from Second Amendment protection proves too much.²¹⁴ As Judge Traxler pointed out in his *Kolbe* dissent, “the [majority's] suggestion that the ability to accept large-capacity magazines facilitates a firearm's military usefulness applies to all semiautomatic weapons, including constitutionally-protected handguns, since any firearm that can hold a magazine can theoretically hold one of any size.”²¹⁵

Identifying the magazine with the firearm is a favorite tactic of gun-control advocates. They inflate the number of mass shootings involving “assault weapons” by adding shootings involving large-capacity magazines (LCMs), even if the LCMs are not used in “assault weapons.” One example is the Citizens Crime Commission of New York City's 2016 report on *Mayhem Multiplied: Mass Shooters and Assault Weapons*.²¹⁶ The report claims that from 1984-2016 there were 301 percent more injuries and fatalities in mass shootings with assault weapons and LCMs than with other firearms.²¹⁷ While the report identifies 46 mass shootings during this period, only 18 involved “assault weapons.”²¹⁸ The remaining 28 involved other firearms with LCMs, including handguns, but the report never mentions this fact.²¹⁹ The report title and internal graphs leave the impression that all the incidents involved “assault weapons.”

Kolbe says that LCMs “are ‘designed to enhance’ a shooter's ‘capacity to shoot multiple human targets very rapidly.’”²²⁰ It further declares that LCMs “depriv[e] victims and law enforcement officers of opportunities to escape or overwhelm the shooters while they reload their weapons” and that *236 “reducing the number of rounds that can be fired without reloading increases the odds that lives will be spared in a mass shooting.”²²¹ Smaller magazines presumably will force the shooter to make additional magazine changes, thus slowing the shooter's rate of fire and giving bystanders more opportunities to subdue the shooter or escape the scene while the shooter is reloading. The Fourth Circuit cited no empirical evidence to support this conclusion, but rather relied on simple arithmetic: if a shooter uses 10-round magazines instead of 30, 50, or 100-round magazines, for every 100 rounds fired, that would afford six to nine more chances for bystanders to subdue or escape the shooter.²²²

While *Kolbe's* arithmetic is true in theory, it is not as simple in fact. Determining the extent to which larger magazine capacity increases the AR-15's lethality in actual shootings beyond other firearms depends on several variables. The AR-15 does not fire any faster mechanically with a 30-round magazine than with a 10-round magazine, nor does the size of the magazine affect

how powerfully the AR-15's bullets strike or how accurately it shoots.²²³ Magazine changes do not pause firing by much. An experienced shooter can perform a speed reload in as little as two or three seconds.²²⁴ Inexperienced shooters will take a few seconds longer. Everything else being equal, a larger-capacity magazine will allow the shooter to stay on target longer because the shooter will less frequently need to pause and reload. But everything else rarely is equal in actual shootings. A variety of factors must be considered, including the shooter's determination to injure or kill, the shooter's rate of fire, whether the shooter needs to change magazines, how fast the shooter can change magazines, how many magazines (or alternate weapons) are readily available to the shooter, the location of bystanders, and whether they are in a posture to overpower or escape the shooter. A shooter may even reload before his magazines are empty.²²⁵ These factors make it difficult to determine whether smaller magazines will have any measurable effect on mass shootings.

***237** Criminologist Gary Kleck recently studied whether LCMs directly contribute to the number of injuries and deaths in mass shootings.²²⁶ He wanted to know whether there was evidence that (1) significant numbers of mass shootings were disrupted by bystanders when the shooters paused to reload and (2) magazine changes increase the intervals between shots fired, giving victims time to escape to safety.²²⁷ Out of all mass shootings in the United States from 1994-2013 in which a shooter was using a semiautomatic firearm and detachable magazines (with or without LCMs), he found only one case--the 2011 Tucson shooting that critically injured Representative Gabrielle Giffords--in which the shooter was tackled by bystanders, while the shooter purportedly was trying to reload.²²⁸ Kleck acknowledged that the absence of an LCM in this one case might have prevented several casualties.²²⁹

Kleck identified 23 mass shootings in the United States from 1994-2013 in which more than six persons were shot, either fatally or non-fatally, and one or more LCMs were known to have been used.²³⁰ In all of these incidents, the shooter possessed multiple magazines and, in 17 cases, the shooter possessed multiple firearms.²³¹ Even if magazine sizes were limited to 10 rounds, Kleck explained, the shooters either could have switched guns or reloaded in a few seconds and continued shooting--in fact, in 14 of the 23 incidents, the shooters did reload without bystander interference, so smaller magazines would not have made any difference.²³² The shooters did not reload in two incidents and it was not known whether the shooters reloaded in the remaining seven incidents.²³³

To determine whether more magazine changes would allow potential victims to escape, Kleck looked at the average rates of fire that mass shooters typically maintain.²³⁴ If a shooter fires faster than the 2-4 seconds it takes to change magazines, then smaller magazines could slow the rate of fire and potentially allow more victims to escape between shots; if the shooters fire ***238** with average between-shot intervals lasting more than the 2-4 seconds it takes to change a magazine, the pauses due to magazine changes would not be any longer than the pauses between shots when not reloading, and thus additional magazine changes would not provide any greater opportunity to escape.²³⁵ In the 25 shootings in which rates of fire could be determined, Kleck found only three occasions in which shooters fired more rapidly, averaging less than two seconds between rounds. In two of the three shootings, the shooters possessed multiple guns and simply could have switched guns with little or no pause in their shooting.²³⁶ The one remaining incident in the 20-year study period involved the Tucson shooting, where the shooter fired rapidly, had only a single weapon, and was stopped when tackled by bystanders.²³⁷

Kleck concluded because that shooters' rates of fire typically are not slowed by changing magazines, LCM bans are unlikely to provide any significant benefit to mass shooting victims. Shooters still can fire equally large numbers of rounds using smaller capacity magazines.²³⁸ Kleck attributed any increase in lethality more to the shooter's intention than to the LCM:

[T]he larger number of rounds fired by LCM-using shooters is more likely to reflect the more lethal intentions prevailing among such shooters, just as their planned use of multiple guns and multiple magazines, and the unusually high fatality rate (deaths over total woundings) of their attacks are outward indications of a desire to shoot many people. Unfortunately, there are no known methods for reliably measuring the lethality of shooters'

intentions independent of the outcomes of their crimes, making it impossible to statistically control for this factor in a multivariate statistical analysis and thereby isolate the effects of LCM use.²³⁹

While Kleck's analysis is not conclusive, it highlights the difficulties in determining the extent to which magazine size makes a difference in mass shootings. The matter is far more complicated--and thus demands more proof-- than *Kolbe*'s simple arithmetic.²⁴⁰

*239 *Kolbe* also relies on "lesson[s] learned" from Newtown, Tucson, and Aurora shootings that purportedly show how smaller magazines will save lives.²⁴¹ But the Fourth Circuit's descriptions of these shootings are misleading. The court twice claimed without citation that during the Newtown shooting nine children were able to run from classroom while the gunman paused to change a 30-round magazine.²⁴² While reported in a few media accounts,²⁴³ this fact was never confirmed. The final report of the State's Attorney on the shooting states only that "[n]ine children had run out [Ms. Soto's] room and survived," without giving any details about why they were able escape.²⁴⁴ The Hartford Current reported that six children ran past the shooter to safety when his gun jammed.²⁴⁵ An earlier Hartford Current article stated that the children escaped because the shooter "stopped firing briefly, perhaps either to reload his rifle or because it jammed."²⁴⁶ The article goes on to say that while it was possible the shooter mishandled or dropped a magazine while reloading, it also was possible that the gun jammed or that the children escaped while the shooter was firing at others in the room.²⁴⁷ The article indicated that the children's statements about the incident were "not entirely consistent."²⁴⁸

Kolbe further declares says that during the Aurora movie shooting "a 100-round drum magazine was emptied without any significant break in the firing."²⁴⁹ This never happened. Multiple sources, including the city's official after action report, state that the Aurora shooter fired 65 rounds from his AR-15 before the magazine jammed.²⁵⁰ Even deposition testimony of *240 one of the state's experts in *Kolbe* acknowledges that the shooter's gun jammed and the magazine was not emptied.²⁵¹ *Kolbe* also says that the Tucson shooter "was finally tackled and restrained by bystanders while reloading his firearm."²⁵² But this fact is disputed. Eyewitness reports of the shooting are conflicting as to whether the gunman was subdued by bystanders when his handgun jammed or while reloading.²⁵³

This is not about whether shooters have been stopped while reloading--they have on multiple occasions.²⁵⁴ But that proves nothing about whether the size of the magazine affected the outcome. Here, the question is whether the ability to accept larger-capacity magazines makes the AR-15 and other "assault weapons" much more dangerous than other semiautomatic firearms. That requires some credible proof that reducing magazine capacity will significantly reduce casualties in mass shootings or other crimes. Simple arithmetic and misleading anecdotal evidence are not enough.

Pistol grips, barrel shrouds, adjustable stocks, flash hiders, and the ability to accept 30-round magazines do not transform the civilian AR-15 into the functional equivalent of an M16, nor do they somehow make the AR-15 far more lethal than other civilian firearms. The combined effects of judicial ignorance about such features, anti-gun disinformation, and a failure to seriously examine the facts have driven the courts' conclusions to the contrary.

III. CONCLUSION

My purpose here is to demonstrate the importance of judges having accurate facts when making decisions about the constitutionality of "assault *241 weapon" bans. No one expects judges to be firearms experts, competitive shooters, or even occasional range visitors. But judges should be serious arbiters of facts, especially on a topic as susceptible to widely-disseminated disinformation and myths as "assault weapon" bans. Judges should not let honest unfamiliarity become willful

ignorance, lest their judicial decisions become political narrative. Regrettably, this already seems to have happened in some cases.

Still, there are greater tragedies here than judicial incompetence or bias. By blessing simplistic and ineffective legislative attempts to reduce gun violence,²⁵⁵ these court decisions obscure the complexities surrounding the actual causes of such violence. Reducing violence perpetrated by persons with guns--especially mass shooters--is much more complicated than banning "assault weapons." It requires effective and narrowly-tailored laws, mental health reform, media self-restraint, proper family guidance and supervision, enhanced security measures, and law enforcement competence. Judges also should not exaggerate the relative dangerousness of the AR-15 to justify their decisions when the civil rights of millions of law-abiding persons depend on those decisions. While public safety is a paramount concern, so is the freedom of responsible citizens to choose for themselves the firearms best suited to their self-defense needs.

Footnotes

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¹ See, e.g., [D.C. Code § 7-2501.01\(3A\)\(A\) \(2018\)](#) (defining assault weapons under D.C. code); [N.Y. Penal Law § 265.00\(22\) \(2018\)](#) (defining assault weapons under N.Y. law).

² See, e.g., [Conn. Gen. Stat. § 53-202a \(2013\)](#); [Md. Code Ann., Crim. Law § 4-301\(d\) \(LexisNexis 2018\)](#) (banning specific "assault long guns" listed under Md. Code Ann., Pub. Safety § 5-10(r)(2) (LexisNexis 2018) and "copycat weapons" as defined by certain features listed in the code). The scope of this article is limited to semiautomatic rifles and does not include semiautomatic pistols and shotguns included in most "assault weapons" bans.

³ See Jon Schuppe, *America's rifle: Why so many people love the AR-15*, NBC News (Dec. 27, 2017, 1:19 PM), https://www.nbcnews.com/news/us-news/america-s-rifle-why-so-many-people-love-ar-15-n831171?cid=public-rss_20171228 (noting that that Americans own an estimated 15 million AR-15s and that "the AR-15 remains a jewel of the gun industry, the country's most popular rifle, irreversibly lodged into American culture"); *'AR' Stands for ArmaLite*, National Shooting Sports Found., <https://www.nssf.org/ar-stands-for-armalite/> (last visited July 3, 2018) (noting that the "AR" does not stand for "assault rifle" but rather for "ArmaLite," the company that developed the prototype rifle that later became the military M16 and the civilian AR-15). This article uses "AR-15" as a shorthand term for all AR-15 variants.

⁴ [District of Columbia v. Heller](#), 554 U.S. 570, 599 (2008) (holding that the Second Amendment protects the individual right to keep and bear arms for self-defense, whether against a tyrannical government or common criminal).

⁵ See [Kolbe v. Hogan](#), 849 F.3d 114 (4th Cir. 2017); [N.Y. State Rifle & Pistol Ass'n v. Cuomo](#), 804 F.3d 242 (2d Cir. 2015); [Friedman v. City of Highland Park](#), 784 F.3d 406 (7th Cir. 2015); [Heller v. District of Columbia \(Heller II\)](#), 670 F.3d 1244 (D.C. Cir. 2011). The First Circuit currently is reviewing a Second Amendment challenge to Massachusetts' "assault weapons" ban. See [Worman v. Healey](#), 293 F. Supp. 3d 251 (D. Mass. 2018), *appeal docketed* No. 18-1545 (1st Cir. June 19, 2018).

⁶ [N.Y. State Rifle & Pistol Ass'n](#), 804 F.3d at 257-61; [Heller II](#), 670 F.3d at 1262-64.

⁷ [Friedman](#), 784 F.3d at 410 (internal quotations and citations omitted).

⁸ *Id.* at 411-12. The court noted that even if the ban's public safety goals are not realized, making the public "feel safer" was a substantial benefit. *Id.* at 412.

- 9 *Kolbe*, 849 F.3d at 130-37, 141-46.
- 10 *Id.* at 124, 135. *Kolbe* alternatively held that Maryland's "assault weapon" ban survived intermediate scrutiny. *Id.* at 138-41.
- 11 *Id.* at 125, 127, 137, 144 (citing Bureau of Alcohol, Tobacco, and Firearms, Report and Recommendation of the ATF Working Group on the Importability of Certain Semiautomatic Rifles (1989) [hereinafter ATF Report] at Joint Appendix [hereinafter "J.A."] 735; H.R. Report No. 103-489 (1994) at J.A. 1120-22; Marcus Brown Decl. at J.A. 206 (Superintendent of Maryland State Police); James W. Johnson Decl. at J.A. 227 (Chief of Baltimore County Police Dept.); Henry Swawinski Decl. at J.A. 279 (Deputy Chief of Prince George County Police Dept.); Anthony Batts Decl. at J.A. 265 (Commissioner of Baltimore Police Dept.)); *see* Marcus Brown Dep. at J.A. 2470, *Kolbe v. Hogan*, 849 F.3d 114 (4th Cir. 2017) (No. 14-1945) ("I'm not sort of a firearms expert"); James Johnson Dep. at J.A. 2446, *id.* ("I am not a ballistics expert" and subsequently agreeing that he is not a firearms expert); Anthony Batts Dep. at J.A. 2400, 2418, *id.* ("I am not an expert"); Henry Stawinski Dep. at J.A. 2487-88, *id.* (admitting he has not been trained in the use of any of the banned firearms and has fired an AR-15 on only one occasion)).
- 12 *Id.* at 124, 144. The *Kolbe* plaintiffs submitted declarations and reports from Gary Roberts, a firearms and ballistics expert, Roberts Decl. at J.A. 2086, *Kolbe*, 849 F.3d 114 (No. 14-1945), Guy Rossi, a firearms and tactics expert, Rossi Decl. at J.A. 2119, *id.*, Buford Boone, a firearms and ballistics expert who formerly directed the FBI Ballistic Research Facility for 15 years, Boone Decl. at J.A. 2163, *id.*, and Jim Supica, a firearms historian, Supica Decl. at J.A. 2245, *id.*. These experts specifically controverted much of the state's evidence regarding the features and functions of the AR-15.
- 13 Josh Sugarman, *Assault Weapons and Accessories in America*, Conclusion, Violence Policy Center (1988), <http://www.vpc.org/studies/awaconc.htm>.
- 14 *Id.*
- 15 *Id.*
- 16 Tom Diaz, *Bullet Hoses: Semiautomatic Assault Weapons--What Are They? What's So Bad About Them?*, Violence Policy Center (May 2003), <http://www.vpc.org/publications/bullet-hoses>.
- 17 Tom Diaz, *Bullet Hoses - The "Father of All Assault Rifles,"* Chapter in Diaz, *id.*
- 18 Tom Diaz, *Bullet Hoses - What's So Bad About Semiautomatic Assault Weapons*, Chapter in Diaz, *id.*
- 19 *See* Joseph Avery, *An Army Outgunned: Physics Demands a New Basic Combat Weapon*, *Military Review* 3 (July-August 2012), https://www.armyupress.army.mil/Portals/7/militaryreview/Archives/English/MilitaryReview_20120831_art004.pdf (noting that "spray fire" refers to a large volume of "not well aimed and placed shots.").
- 20 *See* ATF Report, *supra* note 11, at 5-6 ("True assault rifles are selective fire weapons that will fire in a fully automatic mode.") (citing Daniel D. Musgrave & Thomas B. Nelson, *The World's Assault Rifles 1* (T.B.N. Enterprises, 1967)).
- 21 *See infra* text accompanying notes 78-80.
- 22 *See* Bruce Kobayashi & Joseph Olson, *In re 101 California Street: A Legal and Economic Analysis of Strict Liability for the Manufacture and Sale of "Assault Weapons,"* 8 Stan. L. & Pol'y Rev. 41, 43 (1997) ("Prior to 1989, the term 'assault weapon' did not exist in the lexicon of firearms. It is a political term, developed by anti-gun publicists to expand the category of 'assault rifles' so

as to allow an attack on as many additional firearms as possible on the basis of undefined ‘evil’ appearance.”); *see also* Stephen P. Halbrook, *Reality Check: The “Assault Weapon” Fantasy and Second Amendment Jurisprudence*, 14 Geo. J.L. & Pub. Pol’y 47, 49 (2016) (“The term ‘assault weapon’ ... became a classic case of ‘an Alice-in-Wonderland world where words have no meaning.’”) (quoting *Welsh v. United States*, 398 U.S. 333, 354 (1970) (Harlan, J., concurring)).

- 23 Laurence Tribe (@tribelaw), Twitter (Feb. 24, 2018, 4:27 AM) (tweet deleted) (screen shot in possession of author). Tribe doubled down on the figure after being criticized, claiming in a subsequent tweet that “I researched it; didn’t draw the 10ps rate from thin air.” Laurence Tribe (@tribelaw), Twitter (Feb. 24, 2018, 10:34 AM), <https://twitter.com/tribelaw/status/967467905830019072?lang=en>. He then admitted he was wrong and said it was 5 rounds per second. Laurence Tribe (@tribelaw), Twitter (Feb. 24, 2018, 3:04 PM) <https://twitter.com/tribelaw/status/967535732624674818>. He finally edited his original tweet to say “4 to 8 rounds PER SECOND.” Laurence Tribe (@tribelaw), Twitter (Feb. 24, 2018, 4:55 PM), <https://twitter.com/tribelaw/status/967563721810763776>.
- 24 Washington FreeBeacon, *Alan Grayson claims AR-15 can fire 700 rounds per minute, which is ridiculous*, YouTube (June 13, 2016), <https://www.youtube.com/watch?v=ThKlXcAaVNk>.
- 25 *See infra* Part II-B for a discussion of the AR-15’s rate of fire.
- 26 UserUnknown00, *Bloomberg Doesn’t Know SemiAuto from Auto*, YouTube (Dec. 23, 2012), https://www.youtube.com/watch?time_continue=7&v=iV5E30ZY1kQ.
- 27 Jacob Sullum, ‘Assault Weapons,’ Explained: How a scary name for an arbitrary group of firearms distorts the gun control debate, Reason (June 2018), <https://reason.com/archives/2018/05/14/assault-weapons-explained>.
- 28 *Kolbe v. Hogan*, 849 F.3d 114, 136 (4th Cir. 2017) (quoting *District of Columbia v. Heller*, 554 U.S. 570, 627 (2008)).
- 29 Kent Jenkins, Jr., *Calls for Ban Boost Assault Rifle Sales*, Wash. Post (Mar. 6, 1989), https://www.washingtonpost.com/archive/local/1989/03/06/calls-for-ban-boost-assault-rifle-sales/0d6c6d39-99da-4e0d-8318-a5d246762081/?utm_term=.5da5c0686193.
- 30 *Public Safety and Recreational Firearms Use Protection Act: Hearing on H.R. 3527 Before the Subcomm. on Crime & Criminal Justice of the Comm. On the Judiciary*, 103d Cong. 1 (1994) (statement of Sen. Charles Schumer).
- 31 150 Cong. Rec. S1947-09, S1953 (daily ed. Mar. 2, 2004) (statement of Sen. Dodd).
- 32 *Assault Weapons: “Mass Produced Mayhem”* Brady Center to Prevent Gun Violence, (October 2008), <https://www.bradycampaign.org/sites/default/files/mass-produced-mayhem.pdf>.
- 33 *Why America Needs to Get Military-Style Weapons Off Our Streets*, Law Center to Prevent Gun Violence, <http://smartgunlaws.org/wp-content/uploads/2017/04/Assault-Weapons-Factsheet-2013.pdf> (last visited Sept. 30, 2018).
- 34 *See Heller v. District of Columbia*, 698 F. Supp. 2d 179, 193 (D.D.C. 2010) (internal quotation omitted).
- 35 *Kolbe v. Hogan*, 849 F.3d 114, 124 (4th Cir. 2017). *See also Cutonilli v. Maryland*, 251 F. Supp. 3d 920, 922 (D. Md. 2017) (noting that “assault weapons” are “weapons of war” restricted under Maryland’s Firearm Safety Act of 2013).
- 36 *Kolbe*, 849 F.3d at 137 (quoting J.A. 735) (internal quotations and brackets omitted).

- 37 Gary Kleck, *Point Blank: Guns and Violence in America* 70 (1991) (“Most firearms, no matter what their current uses, derive directly or indirectly from firearms originally designed for the military”).
- 38 *Heller*, 554 U.S. 570, 624-25 (2008) (quoting *State v. Kessler*, 614 P.2d 94, 98 (Or. 1980) (citing G. Neumann, *Swords and Blades of the American Revolution* 6-15, 252-54 (1973)) (internal quotation omitted); see *id.* at 627 (recognizing that the founding-era militia consisted of citizens “who would bring the sorts of lawful weapons they possessed at home to militia duty”).
- 39 See David E. Petzal, *The Rifle That Won the West*, *Field & Stream* (Dec. 11, 2003), <https://www.fieldandstream.com/articles/guns/rifles/2003/12/rifle-won-west>.
- 40 See Winchester Repeating Arms, <http://www.winchesterguns.com/products/rifles/model-94.html>; Henry Lever Action Rifles, <https://www.henryusa.com/firearm-category/lever-action-rifles/>; Marlin Firearms, <https://www.marlinfirearms.com/lever-action>.
- 41 See John Lacy, *Remington Model 30 Bolt Action, High-Power Rifles: A History and Users Manual*, Remington Society of America, <https://www.remingtonsociety.org/remington-model-30-bolt-action-high-power-rifles>.
- 42 See Kennedy Hickman, *World War II: M1 Garand Rifle*, ThoughtCo. (June 4, 2017), <https://www.thoughtco.com/world-war-ii-m1-garand-2361245/>; *M1 Garand*, Civilian Marksmanship Program, http://thecmp.org/cmp_sales/rifle_sales/m1-garand/; *M1 Carbine*, Civilian Marksmanship Program, http://thecmp.org/cmp_sales/rifle_sales/m1-carbine/. The federal government recently announced that 100,000 surplus M1911 handguns in storage since the 1980s will be sold to civilians through the Civilian Marksmanship Program. See Chris Eger, *How, when and where will the CMP 1911s be available?*, *Guns.com* (November 22, 2017), <http://www.guns.com/2017/11/22/how-when-and-where-will-the-cmp-1911s-be-available/>.
- 43 See Ian v. Hogg & John S. Weeks, *Military Small Arms of the 20th Century* 220 (7th ed. 2000).
- 44 See Scott Engen, *The History of the 1911 Pistol*, *Browning* (Jan. 24, 2011), <http://www.browning.com/news/articles/history-of-the-1911-pistol.html>; 92 FS, *Beretta*, <http://www.beretta.com/en-us/92-fs/> (last visited July 1, 2018); P226, *SIG Sauer*, <https://www.sigsauer.com/products/firearms/pistols/p226/> (last visited July 1, 2018).
- 45 See Robert A. Sadowski, *Glock: The Pistol that Changed Handguns*, *Range 365* (July 17, 2017), <https://www.range365.com/history-glock>; *How The Glock Became America's Weapon of Choice*, *NPR Fresh Air* (Jan. 24, 2012), <https://www.npr.org/2012/01/24/145640473/how-the-glock-became-americas-weapon-of-choice>.
- 46 Ashley Hlebinsky, *The 28 Most Notable Guns in Remington's 200-Year History*, *Outdoor Life* (June 30, 2016), <https://www.outdoorlife.com/articles/guns/2016/06/28-most-notable-guns-remingtons-200-year-history>.
- 47 Charles Cutshaw, *Heckler & Koch/Benelli M4 Super 90/XM1014: The US Military's Innovative New Tactical Shotgun*, *Small Arms Review* (Dec. 25, 2015), <http://www.smallarmsreview.com/display.article.cfm?idarticles=3200>.
- 48 Victor & Cheryl Havlin, *Since 1919 ... A Look at the Storied History of Mossberg*, *Mossberg Blog* (June 17, 2015), <https://www.mossberg.com/since-1919-a%E2%80%88look-at-the-storied-history-of-mossberg/>.
- 49 *United States v. Miller*, 307 U.S. 174, 178 (1939) (citing *Aymette v. Tennessee*, 21 Tenn. 154 (1840)).
- 50 *Id.* at 179.

- 51 *Id.* at 178.
- 52 District of Columbia v. Heller, 554 U.S. 570, 624-25 (2008) (emphasis added). The Court reaffirmed this proposition in *Caetano v. Massachusetts*, 136 S. Ct. 1027 (2016) (per curiam), reversing a lower court's denial of Second Amendment protection to stun guns on the ground that there was no evidence that they had military utility.
- 53 *Heller*, 554 U.S. at 624.
- 54 *Id.* at 625, 627.
- 55 *Id.* at 627.
- 56 *Id.* at 636 (Stevens, J., dissenting) (“The Second Amendment plainly does not protect the right to use a gun to rob a bank; it is equally clear that it *does* encompass the right to use weapons for certain military purposes.”) (original emphasis); *id.* at 646 (noting that the phrase “[t]o keep and bear arms” describes a “unitary right: to possess arms if needed for military purposes and to use them in conjunction with military activities”).
- 57 *Id.* at 647.
- 58 See *id.* at 618 (majority opinion) (“But a militia would be useless unless the citizens were enabled to exercise themselves in the use of warlike weapons.”) (quoting J. Pomeroy, *An Introduction to the Constitutional Law of the United States* § 239, at 152-53 (1868)) (internal quotations omitted); *id.* at 619 (“Some general knowledge of firearms is important to the public welfare; because it would be impossible, in case of war, to organize promptly an efficient force of volunteers unless the people had some familiarity with weapons of war.”) (quoting B. Abbott, *Judge and Jury: A Popular Explanation of the Leading Topics in the Law of the Land* 333 (1880)) (internal quotations omitted).
- 59 U.S. Dep’t of Army, Training Circular 3-22.9, Rifle and Carbine 2-1 (2016) [hereinafter *Army Rifle and Carbine Training Circular*]. The military is replacing the M16 with the M4A1 as its standard service weapon. See Kyle Mizokami, *M4 Carbine: The Gun the Army Loves to Go to War With*, *The National Interest* (May 31, 2018), <http://nationalinterest.org/blog/the-buzz/m4-carbine-the-gun-the-army-loves-go-war-26049?page=2>.
- 60 U.S. Dep’t of Army, Field Manual 3-22.9, Rifle Marksmanship: M16-/M-4 Series Weapons 4-11, 4-12 (2008) [hereinafter *Army Rifle Marksmanship Manual*] (explaining that M16A1/A3 rifles and M4A1 carbines fire in fully automatic mode, while M16A2/A4 rifles and M4 carbines fire in a three-round burst mode).
- 61 See *Staples v. United States*, 511 U.S. 600, 602 n.1 (1994) (“[T]he terms ‘automatic’ and ‘fully automatic’ refer to a weapon that fires repeatedly with a single pull of the trigger. That is, once the trigger is depressed, the weapon will automatically continue to fire until its trigger is released or the ammunition is exhausted. Such weapons are ‘machine guns’ within the meaning of the [National Firearms] Act.”); see also 26 U.S.C. § 5845(b) (2018) (defining “machine gun” to mean “any weapon which shoots ... automatically more than one shot, without manual reloading, by a single function of the trigger.”).
- 62 See Gun Control Act of 1968, 18 U.S.C. § 921(a)(28) (defining “semiautomatic rifle” as any repeating rifle which uses a portion of the energy of a firing cartridge to extract the fired cartridge case and chamber the next round, and which requires a separate pull of the trigger to fire each cartridge); *Staples*, 511 U.S. at 602 n.1 (“We use the term ‘semiautomatic’ to designate a weapon that fires only one shot with each pull of the trigger, and which requires no manual manipulation by the operator to place another round in the chamber after each round is fired.”).

- 63 *Staples*, 511 U.S. at 603.
- 64 *Kolbe v. Hogan*, 849 F.3d 114, 124 (4th Cir. 2017).
- 65 *Id.* at 126.
- 66 *Id.* at 124.
- 67 *Id.* at 137 (quoting J.A. 735) (internal quotations and brackets omitted).
- 68 *Id.* at 125 (quoting J.A. 206).
- 69 *Heller v. District of Columbia (Heller II)*, 670 F.3d 1244, 1263 (D.C. Cir. 2011).
- 70 26 U.S.C. §§ 5801-5872; *see also* The Bureau of Alcohol, Tobacco, Firearms and Explosives, *National Firearms Act Handbook*, U.S. Dep't of Just. (Apr. 2009), <https://www.atf.gov/firearms/docs/guide/atf-national-firearms-act-handbook-atf-p-53208/download>.
- 71 18 U.S.C. § 922(o) (2018); *see also* Letter from Stephanie M. Boucher, Chief, Disclosure Div., U.S. Dept. of Justice Bureau of Alcohol, Tobacco, Firearms and Explosives to Jeffrey Folloder, Exec. Dir., Nat'l Firearms Act Trade & Collectors Ass'n (Feb. 24, 2016), http://www.nfatca.org/pubs/MG_Count_FOIA_2016.pdf (reporting that in February 2016 there were 175,977 transferrable pre-1986 machine guns in the U.S.).
- 72 *Staples v. United States*, 511 U.S. 600, 622 (1994) (Ginsburg, J., concurring).
- 73 *United States v. Kirk*, 105 F.3d 997, 1002 (5th Cir. 1997). *See also* *United States v. Thomas*, 531 F.2d 419, 423 (9th Cir. 1976) (Hufstедler, J., dissenting) (“[O]ur society does not put hand guns and rifles in the same category of suspected dangerousness as machine guns, hand grenades, sawed-off shotguns, and other lethal hardware[.]”).
- 74 *See Service Rifle*, Wikipedia, https://en.wikipedia.org/wiki/Service_rifle (last visited Sept. 30, 2018) (listing service rifles from various nations).
- 75 Harold E. Johnson, Defense Intelligence Agency, *Small Arms Identification and Operation Guide--Eurasian Communist Countries* (1973), <https://www.scribd.com/document/117824077/Small-Arms-Identification-and-Operation-Guide-Eurasian-Communist-Countries>.
- 76 Harold E. Johnson Decl., *Heller v. District of Columbia*, 698 F. Supp. 2d 179 (D.D.C. Sept. 14, 2009) (No. 1:08-cv-01289); *see also* Halbrook, *supra* note 22, at 59-60 (listing Johnson's qualifications and additional statements).
- 77 *Staples*, 511 U.S. at 603. *See* *N.Y. State Rifle & Pistol Ass'n v. Cuomo*, 804 F.3d 242, 256 (2d Cir. 2015) (“Because the AR-15 is ‘the civilian version of the military’s M-16 rifle,’ defendants urge that it should be treated identically for Second Amendment purposes. But the Supreme Court’s very choice of descriptor for the AR-15--the ‘civilian version’--could instead imply that such guns ‘traditionally have been widely accepted as lawful.’”) (internal citations omitted).

- 78 The United States Defense Intelligence Agency defines “assault rifles” as “short, compact, selective-fire weapons that fire a cartridge intermediate in power between a submachine gun and rifle cartridges. Assault rifles have mild recoil characteristics and, because of this, are capable of delivering effective full automatic fire at ranges up to 300 meters.” Johnson, *supra* note 75, at 105.
- 79 For more extensive discussions of the historical development of military assault rifles, see Duncan Long, *The Complete AR-15/M16 Sourcebook: What Every Shooter Needs to Know* 3-61 (2002); Hogg, *supra* note 43, at 243, 271, 286-87, 291-92; Thomas L. McNaugher, *Marksmanship, McNamara, and the M16 Rifle: Organizations, Analysis and Weapons Acquisition* (Rand Corp. Paper Series 1979), <https://www.rand.org/pubs/papers/P6306.html>; Joe Poyer, *The M16/AR15 Rifle: A Shooter's and Collector's Guide* 13-20 (2013). McNaugher's paper, a condensation of his 1977 Ph.D. dissertation at Harvard, provides one of the best short histories on the philosophy behind the development of the M16 rifle.
- 80 See Edward Clinton Ezell, *Small Arms of the World* 784 (1983); Hogg, *supra* note 43 at 287, 292; James Fallows, *M-16: A Bureaucratic Horror Story*, *The Atlantic* (June 1981), <https://www.theatlantic.com/magazine/archive/1981/06/m-16-a-bureaucratic-horror-story/545153/>.
- 81 *Kolbe v. Hogan*, 849 F.3d 114, 124 (4th Cir. 2017).
- 82 *Army Rifle Marksmanship Manual*, *supra* note 60, at 7-13; see also Dennis Chapman, *The ‘Weapons of War’ Myth*, LinkedIn (Dec. 7, 2015), <https://www.linkedin.com/pulse/weapons-war-myth-dennis-chapman> (explaining that “[w]hether burst or full auto, selective fire serves one function in combat--to gain fire superiority over an enemy force. Fire superiority is achieved when the enemy has been suppressed--which is to say, when one side is placing such a high volume of fire into the enemy's general vicinity that the enemy is forced to seek cover and is thereby prevented from returning effective fire (they may still shoot back, but not very well.”).
- 83 *See Army Rifle Marksmanship Manual*, *supra* note 60, at 7-13, 7-16, 7-19, 7-47 (2008); cf. Arthur D. Osborne & Seward Smith, *Analysis of M16A2 Rifle Characteristics and Recommended Improvements* 7-8, 11 (Feb. 1986), <http://www.dtic.mil/dtic/tr/fulltext/u2/a168577.pdf> (noting that fully automatic fire is useful “to clear and defend buildings, to conduct final assaults on enemy positions, to defend against an enemy final assault, to conduct an ambush,” and “to react to an enemy ambush” and explaining that high-volume suppressive fire is more useful at close-range when closing in on an enemy position).
- 84 *See Hognose, Burst Selector: An Idea Whose Time Has Come and Gone*, *WeaponsMan* (March 21, 2016) <http://weaponsman.com/?p=30530> (“anyone who's been well trained uses an assault rifle in semi auto mode well over 90% of the time”).
- 85 Chapman, *supra* note 82.
- 86 *Kolbe v. Hogan*, 849 F.3d 114, 125 (4th Cir. 2017).
- 87 *Id.* at 136.
- 88 *Id.*
- 89 *Id.* at 134, 143 (quoting *Kolbe v. O'Malley*, 42 F. Supp. 3d 768, 789 n.29 (D. Md. 2014)) (emphasis added). This bizarre observation echoes the Violence Policy Center's claim that “[c]ivilian semiautomatic assault weapons ... are arguably more deadly than military versions, because most experts agree that semiautomatic fire is more accurate--and thus more lethal-- than automatic fire.” Tom Diaz, *Bullet Hoses - Ten Key Points about What Assault Weapons Are and Why They are So Deadly*, Chapter in Diaz, *supra* note 16 (emphasis added).

- 90 *Kolbe*, 849 F.3d at 144 (“The relevant question is not whether they are themselves M16s or other arms used by a military; or whether they are useful at all or only useful in military service; or whether they have this or that single feature in common with a non-banned firearm. Rather, the issue is whether the banned assault weapons and large-capacity magazines possess an amalgam of features that render those weapons and magazines like M16s and most useful in military service.”).
- 91 *Id.* at 125 (emphasis added).
- 92 *Id.* at 137 (emphasis added).
- 93 *Id.* at 144 (emphasis added).
- 94 Atf Report, *supra* note 11, at 6 (1989) (emphasis added) (found at J.A. 734-35).
- 95 *See id.* at 5-6 (noting that “[t]rue assault rifles are selective fire weapons that will fire in a fully automatic mode.”) (citing Daniel D. Musgrave & Thomas B. Nelson, *The World's Assault Rifles 1* (T.B.N. Enterprises, 1967)).
- 96 Of course, the combat effectiveness of a weapon ultimately will depend on the skill of the shooter.
- 97 *Kolbe*, 849 F.3d at 136.
- 98 *Id.* at 125 (quoting J.A. 206) (internal quotation omitted) (emphasis added).
- 99 *Id.* at 137.
- 100 *See supra* Part I.
- 101 Yank D. Coble, Jr, MD et al., *Assault Weapons as a Public Health Hazard in the United States*, 267 J. Am. Med. Ass'n 3067, 3067 (1992). In support of this statement, the article cited a 1990 publication by Handgun Control, Inc. (now the Brady Campaign) entitled *Assault Weapons Questions & Answers*.
- 102 Diaz, *supra* note 16.
- 103 Tom Diaz, *Bullet Hoses - The “Father of All Assault Rifles,”* Chapter in Diaz, *id.*; Tom Diaz, *Bullet Hoses - The Gun Industry's Lies*, Chapter in Diaz, *id.*
- 104 *Banning Assault Weapons--A Legal Primer for State and Local Action 1*, Legal Cmty. Against Violence 1 (2004), http://lawcenter.giffords.org/wp-content/uploads/2012/05/Banning_Assault_Weapons_A_Legal_Primer_8.05_entire.pdf (last visited Sept. 30, 2018). It's unclear what the LCAV meant by “rapid and accurate,” since “spray” firing is notoriously inaccurate.
- 105 *Id.* at 2.
- 106 *Id.* at 4.

- 107 *Friedman v. City of Highland Park*, 784 F.3d 406, 409 (7th Cir. 2015). This description appears in a “what we know” section of the court’s opinion. Judge Easterbrook cited no evidence supporting the claim.
- 108 *Heller v. District of Columbia (Heller II)*, 670 F.3d 1244, 1262-63 (D.C. Cir. 2011). The D.C. Committee on Public Safety asserted that “assault weapons” are “military-style weapons made for offensive military use. They are designed with military features to allow rapid and accurate spray firing. They are not designed for sport, but to kill people quickly and efficiently.” Council of D.C., Comm. on Pub. Safety & the Judiciary, *Rep. on Bill 17-843, Firearms Control Amendment Act of 2008* (2008).
- 109 See Tom Diaz, *Bullet Hoses - The Gun Industry's Lies*, Chapter in Diaz, *supra* note 16.
- 110 See Poyer, *supra* note 79, at 19 (“The M16A1 rifle served with distinction during the war in Vietnam and helped to prove the theory that massive amounts of firepower at ranges of up to 300 meters were more effective than aimed fire at the same distances--the thick rain forest and high grass of Vietnam often prevented soldiers from identifying targets at distances beyond 100 to 200 meters.”).
- 111 *Id.* at 14 (“‘Spray and pray’ would become the practice on the future battlefields of Vietnam.”); *id.* at 19 (“[T]oo much firepower [in Vietnam] was as bad as not enough. Soldiers under fire had the tendency to ... switch[] to full automatic and spray an area, often with little or no effect.”).
- 112 Charles Sasser & Craig Roberts, *One Shot-One Kill* 135 (1990).
- 113 To minimize “spray and pray,” the M16A2, developed in 1983, substituted a three-round burst mode for the fully automatic mode in the M16A1. But the burst mode reduced accuracy due to inconsistent trigger pull and was rarely used. Special forces and other select units began using the smaller selective-fire M4A1 carbine in the 1990s with its fully automatic mode. Over the last several years, the military has been replacing the M16 with the M4A1 in infantry units, thus doing away with the burst mode and returning to the fully automatic mode in its standard service rifles. See Christian Beekman, *Here's why the US military is replacing the M16*, Business Insider (Oct. 28, 2015), <http://www.businessinsider.com/heres-why-the-us-military-is-replacing-the-m16-2015-10>; Kyle Jahner, *Army continues rollout of more durable, full auto M4A1*, ArmyTimes (July 4, 2015), <https://www.armytimes.com/news/your-army/2015/07/04/army-continues-rollout-of-more-durable-full-auto-m4a1/>.
- 114 *Heller v. District of Columbia (Heller II)*, 670 F.3d 1244, 1263 (D.C. Cir. 2011) (quoting Testimony of Brian J. Siebel, Brady Center to Prevent Gun Violence, at 1 (Oct. 1, 2008)) (internal quotations omitted).
- 115 *Kolbe v. Hogan*, 849 F.3d 114, 125 (4th Cir. 2017).
- 116 *Id.* at 136 (emphasis added).
- 117 Force Science Ins., *New Tests Show Deadly Accuracy & Startling Speed Even Inexperienced Shooters Can Achieve in Shooting Cops*, Force Science (Feb. 27, 2007), <http://www.forcescience.org/fsnews/66.html>. The result includes reaction time. The report summary states:
- The shooters were told that at the sound of a timer they should “shoot as fast as you can, as well as you can, trying to hit the target with every shot but not slowing down in an attempt to gain accuracy,” [Ron] Avery said [Avery is an FSRC technical advisor]. “We wanted them to get the first round off in under 1 second and to complete 3 shots within 1.7 seconds. That’s similar to a real assailant bringing a gun out and firing as rapidly as he can.” They were not told what part of the target to try to hit, just “wherever you feel is best.”

Id. A summary of the test and results appears in Force Science Institute, *New reaction-time study addresses what's 'reasonable' in armed-suspect encounters*, PoliceOne.com (May 26, 2011), <https://www.policeone.com/Officer-Safety/articles/3705348-New-reaction-time-study-addresses-whats-reasonable-in-armed-suspect-encounters/>.

- 118 Louis Klarevas, *Rampage Nation: Securing America from Mass Shootings* 211-12 (2016).
- 119 See Eugene Volokh, *Implementing the Right to Keep and Bear Arms for Self-Defense: An Analytical Framework and a Research Agenda*, 56 UCLA L. Rev. 1443, 1484 (2009) (“The laws generally define assault weapons to be a set of semiautomatic weapons (fully automatic weapons have long been heavily regulated, and lawfully owned fully automatics are very rare and very expensive) that are little different from semiautomatic pistols and rifles that are commonly owned by tens of millions of law-abiding citizens. ‘Assault weapons’ are no more ‘high power’ than many other pistols and rifles that are not covered by the bans.”) (footnote omitted).
- 120 Army Rifle Marksmanship Manual, *supra* note 60, at 2-1. A cyclic rate of fire measures how fast the weapon can fire mechanically and does not consider operator factors such as reaction time, reloading, and aiming.
- 121 See Maddhatter111111, *Marine speed reloading m4 2*, YouTube (Mar. 5, 2009), <https://www.youtube.com/watch?v=Hx0JzYcwUiY> (showing U.S. Marine speed reload at 2.6 seconds).
- 122 Fire to destruction testing of the M16A2 at the Rock Island Arsenal in 1996 showed that the barrel ruptured at 491 rounds. Jeff Windham, *Fire to Destruction Test of 5.56mm M4A1 Carbine and M16A2 Rifle Barrels*, Engineering Support Directorate Rock Island Arsenal, Illinois 1-2 (Sept. 1996), www.dtic.mil/get-tr-doc/pdf?AD=ADA317929. For more sustained automatic fire, the military uses the Squad Automatic Weapon (SAW) as well as larger caliber machine guns, all of which have heavier barrels that can be readily replaced when degraded. See, e.g., Capt. JT Elder & Patricia Herndon, *Harnessing the Power of Technology for the Warfighter--USSOCOM S&T MK48 MOD1 Machinegun-- Sustained Fire Upgrade*, NAVSEA Warfare Centers (April 2016), https://ndiastorage.blob.core.usgovcloudapi.net/ndia/2016/armament/18355_Armstrong.pdf.
- 123 *Heller v. District of Columbia (Heller II)*, 670 F.3d 1244, 1263 (D.C. Cir. 2011).
- 124 *Kolbe v. Hogan*, 849 F.3d 114, 136 (4th Cir. 2017).
- 125 *Id.* at 125 (citing J.A. 1120).
- 126 *Id.* at 125, 136; *Heller II*, 670 F.3d at 1263.
- 127 *Kolbe*, 849 F.3d at 125.
- 128 *Heller II*, 670 F.3d at 1263. The district court in *Kolbe* cited Siebel's statement when concluding that the difference in rate of fire between a semiautomatic and fully automatic weapon is “minimal,” 42 F. Supp. 3d 768, 793-94 (D. Md. 2014), *aff'd en banc sub nom. Kolbe v. Hogan*, 849 F.3d 114 (4th Cir. 2017), and that statement was in the *Kolbe* record before the Fourth Circuit at J.A. 1150.
- 129 For a montage of Miculek's speed shooting, see Miculek.com-The Leaders in Gun Control!, *Fastest Shooter OF ALL TIME! Jerry Miculek Incredible Shooting Montage*, YouTube (July 28, 2014), <https://www.youtube.com/watch?v=WyIq9FdTgwM>.
- 130 See the Miculek videos at Miculek.com-The Leaders in Gun Control!, *AR-15 5 shots in 1 second with fastest shooter ever; Jerry Miculek (Shoot Fast!)*, YouTube (June 20, 2013), https://www.youtube.com/watch?v=v3gf_5MR4tE (5 rounds); Miculek.com-The Leaders in Gun Control!, *30 Caliber Magazine Clip in a Half Second! (With the world's FASTEST shooter; Jerry Miculek)*, YouTube (Feb. 6, 2014), <https://www.youtube.com/watch?v=REdjjLBaiOs> (30 rounds with a “clip” spoof). Both of Miculek's times include

reaction time. Miculek typically uses a trigger with a light pull and very short reset. *See* Miculek.com-The Leaders in Gun Control!, *Jerry Miculek's Gear*, <https://miculek.com/guns-gear/jerry-miculeks-gear/> (last visited Sept. 18, 2018) (indicating that Miculek uses the American Gold trigger).

- 131 Video in possession of the author. The result includes reaction time.
- 132 Video in possession of the author. I used a LaRue OBR 5.56 rifle with a Geissele SSA-E trigger and PACT Club shot timer. The result includes reaction time.
- 133 *See supra* text accompanying note 121.
- 134 This figure is an extrapolation from the times discussed *supra* in text accompanying notes 130-32. It may take even longer. Klarevas says that an average shooter can fire two rounds per second from an AR-15, which would require as many as 15 seconds to empty a 30-round magazine. *See* Klarevas, *supra* note 118, at 211-12.
- 135 Dave Kopel, *Rational Basis Analysis of "Assault Weapon" Prohibition*, 20 J. Contemp. L. 381, 389 (1994). The U.S. Army's 2016 Rifle and Carbine Training Circular explains:
- [t]he rifleman's primary role is to engage the enemy with well-aimed shots In this capacity, the rate of fire for the M4 rifle is not based on how fast the Soldier can pull the trigger. Rather, it is based on how fast the Soldier can consistently acquire and engage the enemy with accuracy and precision. Army Rifle and Carbine Training Circular, *supra* note 59, at 5-1.
- 136 Army Rifle Marksmanship Manual, *supra* note 60, at 2-1. Another Army manual puts the maximum effective rate of fire for the M4/M16 on full automatic at 90 rounds per minute. *See* U.S. Dep't of Army, Training Manual 9-1005-319-10, Operators Manual, at 0002 00-1 to 0002 00-2 (June 2010), https://www.sterlingarsenal.com/uploads/TM_9-1005_M16_Operator_Manual_-_2010.pdf [hereinafter Army Operators Manual].
- 137 Army Rifle Marksmanship Manual, *supra* note 60, at 2-1.
- 138 Army Operators Manual, *supra* note 136, at 0002-01 to 0002-02.
- 139 Army Rifle Marksmanship Manual, *supra* note 60, at 7-9. This belies claims by gun-control advocates that AR-15s can be fired rapidly and accurately.
- 140 Robertson v. City & Cty. of Denver, No. 90CV603 (Denver Dist. Ct. Feb. 26, 1993).
- 141 Kopel, *supra* note 135, at 390.
- 142 Force Science Inst., *supra* note 117.
- 143 I used a Sig Sauer P226 Legion 9mm SAO (single action only) handgun and PACT Club shot timer. The results include reaction time.
- 144 Klarevas, *supra* note 118, at 211-12.

- 145 Larry Buchanan et al., *Nine Rounds a Second: How the Las Vegas Gunman Outfitted a Rifle to Fire Faster*, N.Y. Times (Oct. 5, 2017), <https://www.nytimes.com/interactive/2017/10/02/us/vegas-guns.html>.
- 146 *Id.*
- 147 The Orlando shooter used a semiautomatic Sig Sauer MCX carbine, which is similar to an AR-15.
- 148 On March 23, 2018, the Justice Department has issued proposed administrative rule banning bump stocks. *See Bump-Stock-Type Devices*, 83 Fed. Reg. 13, 456 (proposed Mar. 29, 2018).
- 149 *Kolbe v. Hogan*, 849 F.3d 114, 136 (4th Cir. 2017).
- 150 Nelson Lund, *Fourth Circuit Shootout: “Assault Weapons” and the Second Amendment*, 24 Geo. Mason L. Rev. 1233, 1239 n.40 (2017).
- 151 H.R. Rep. No. 103-489, at 18 (1994) (appearing in the *Kolbe* Joint Appendix at J.A. 1120).
- 152 Garry Lee, *Taking the Fight Against Gun Control to the Police*, Washington Post (Aug. 15, 1991), https://www.washingtonpost.com/archive/politics/1991/08/15/taking-the-fight-against-gun-control-to-the-police/c1de803d-9213-4bad-9892-c9055836508f/?utm_term=.0af9cd585be3; see also Osha Gray Davidson, *Under Fire: The nra and the Battle for Gun Control* 274-75 (1998).
- 153 Hearing on Selected Crime Issues: Prevention and Punishment Before the Subcomm. on Crime & Criminal Justice of the H. Comm. on the Judiciary, 102nd Cong., 1st Sess. (May 23, 29, June 12, 26, July 10, 17, and 25, 1991) at 299 (statement of Dewey R. Stokes, National President, Fraternal Order of Police) (Semiautomatic Assault Weapons hearing on June 12, 1991), http://njlaw.rutgers.edu/collections/gdoc/hearings/9/92164661/92164661_2.pdf.
- 154 Council of D.C., Comm. on Pub. Safety & the Judiciary, Rep. on Bill 17-843, “Firearms Registration Amendment Act of 2008” (2008) (attachment of testimony of Brian J. Siebel, October 1, 2008), <http://dclclims1.dccouncil.us/images/00001/20090513152155.pdf> [hereinafter Report on Bill 17-843].
- 155 Joseph D. McNamara, *The Need for Gun Control: Developing a Rational, National Firearms Policy*, *The Police Chief* 26 (Mar. 1988). Siebel provided no source citation for the referenced police test in his written statements to the council, but he earlier had referred to the test in his publication *Assault Weapons: “Mass Produced Mayhem”* (2008), which in turn cited a reference to the test in a 1992 article by Judith Bonderman entitled *In Search of Justice: Compensation for Victims of Assault Weapon Violence*, 20 Product Safety & Liability Rep. 622 (June 26, 1992). The Bonderman article cited McNamara's piece in *The Police Chief* magazine.
- 156 McNamara, *supra* note 155, at 1.
- 157 The standard police timing device in 1988 was a stopwatch. Richard Mann, *Shot Timers - The Time of Your Life*, NRA Shooting Illustrated (Aug. 2, 2016), <https://www.shootingillustrated.com/articles/2016/8/2/shot-timers-the-time-of-your-life/>. Results were imprecise and dependent on the reaction time of the person running the stopwatch. *Id.*
- 158 There is some uncertainty as to exactly how long the shooting lasted. Most reports agree it was three minutes. *See, e.g.*, Mark Emmons & Josh Richman, *Stockton shooting: 25 years later, city can't forget its worst day*, The Mercury News (Aug. 12, 2016) <http://www.mercurynews.com/2014/01/16/stockton-shooting-25-years-later-city-cant-forget-its-worst-day/> (“Purdy's three-

minute shooting rampage left five children dead and 30 teachers and students wounded”); Joshua Logan, *The Stockton Schoolyard Shooting*, Officer.com (June 7, 2016) <https://www.officer.com/tactical/article/12211156/the-stockton-schoolyard-shooting> (“The attack lasted for three minutes from 11:59 am to 12:02 p.m. Pacific Time.”); Tim O'Rourke, *Chronicle Covers: A bloody, horrific school day in Stockton*, San Francisco Chronicle (Jan. 18, 2016), <http://www.sfchronicle.com/news/article/Chronicle-Covers-A-bloody-horrific-school-day-6751921.php> (“He went through more than 100 rounds in three minutes”). *But see Slaughter in a School Yard*, Time Magazine (June 24, 2001), <http://content.time.com/time/printout/0,8816,151105,00.html> (describing the assault as lasting four minutes).

- 159 Nelson Kempsey et al., *A Report to Attorney General John K. Van de Kamp on Patrick Edward Purdy and the Cleveland School Killings* 18 (Oct. 1989) <https://schoolshooters.info/sites/default/files/Purdy%20-%20official%20report.pdf>.
- 160 *Kolbe v. Hogan*, 849 F.3d 114, 120 (4th Cir. 2017). *See generally* Office of the State's Attorney, Judicial District of Danbury, Report of the State's Attorney for the Judicial District of Danbury on the Shootings at Sandy Hook Elementary School and 36 Yogananda Street, Newtown, Connecticut on December 14, 2012 (2013) [hereinafter Sandy Hook Report].
- 161 *Aurora, Colo. theater shooting timeline, facts*, ABC7 (July 26, 2012), <http://abc7.com/archive/8743134>.
- 162 Casey Wian et al., “He intended to kill them all,” prosecutor in theater shooting says, CNN News (Jan. 9, 2013), [http://www.cnn.com/2013/01/09/justice/colorado-theater-shooting/index.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+rss%2Fcnn_latest+\(RSS%3A+Most+Recent\)](http://www.cnn.com/2013/01/09/justice/colorado-theater-shooting/index.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+rss%2Fcnn_latest+(RSS%3A+Most+Recent)); Phil Tenser, “Aurora police testify in James Holmes” trial: 240 ballistic impacts found after theater shooting, KJRH News (May 14, 2015), <http://www.kjrh.com/news/national/aurora-police-testify-in-james-holmes-trial-240-ballistic-impacts-found-after-theater-shooting>.
- 163 Wian, *supra* note 162.
- 164 *Statement of Attorney General Van Hollen on Crandon Multiple Homicides*, Wisconsin Dept. of Justice (Oct. 9, 2007), <https://www.doj.state.wi.us/news-releases/statement-attorney-general-van-hollen-crandon-multiple-homicides>.
- 165 Evan Perez, *Florida school shooter could have fired many more bullets*, CNN (Feb. 27, 2018), <https://www.cnn.com/2018/02/27/us/florida-school-shooter-ammunition-left/index.html>.
- 166 *Compare* Nicholas Nehamas & David Smiley, *Florida school shooter's AR-15 may have jammed, saving lives, report says*, Miami Herald (Feb. 27, 2018), <https://www.miamiherald.com/news/local/community/broward/article202486304.html> (stating the shooter used 10 round magazines) *with* Alex Daugherty & Mary Ellen Klas, *Limiting gun-magazine size poses a problem for Marco Rubio*, Tampa Bay Times (Mar. 29), <http://www.tampabay.com/florida-politics/buzz/2018/03/29/limiting-gun-magazine-size-poses-a-problem-for-marco-rubio/> (stating the shooter used 30 round magazines).
- 167 Adam Goldman et al., *Texas Church Shooting Video Shows Gunman's Methodical Attack, Official Says*, The New York Times (Nov. 8, 2017), <https://www.nytimes.com/2017/11/08/us/texas-shooting-video-devin-kelley.html>; Holly Yan, “Be quiet! It's him!” Survivors say shooter walked pew by pew looking for people to shoot, CNN (Nov. 9, 2017), <https://www.cnn.com/2017/11/07/us/texas-church-shooting-scene/index.html>.
- 168 Klarevas, *supra* note 118, at 209; David Nakamura et al., *Videos show details of Tucson shooting*, Wash. Post (Jan. 19, 2011), <http://www.washingtonpost.com/wp-dyn/content/article/2011/01/18/AR2011011801155.html>; Press Release, James Turgal, *Jared Lee Loughner Sentenced in Arizona on Federal Charges in Tucson Shooting*, FBI Phoenix Division (Nov. 8, 2012), <https://archives.fbi.gov/archives/phoenix/press-releases/2012/jared-lee-loughner-sentenced-in-arizona-on-federal-charges-in-tucson-shooting>.

- 169 TriData Division, *Mass Shootings at Virginia Tech: Addendum to the Report of the Review Panel* 71 (Nov. 2009), <https://schoolshooters.info/sites/default/files/Virginia%20Tech%C20Addendum%C20to%C20the%C20Official%20Report.pdf>.
- 170 *Id.* at 92. The shooter also killed two students at West Ambler Johnston Hall two hours before entering Norris Hall.
- 171 Rick Jervis, *Fort Hood massacre trial: Hasan goes on the defense*, USA Today (July 8, 2013), <https://www.usatoday.com/story/news/nation/2013/07/08/fort-hood-shooting-trial-hasan-court-martial/2427095/>; Charley Keyes, *Fort Hood witness says he feared there were more gunmen*, CNN (Oct. 20, 2010), <http://www.cnn.com/2010/CRIME/10/20/texas.fort.hood.shootings/index.html?hpt=T1>.
- 172 Chris Hawke, *Church, Police Probe 7 Murders*, CBS News (Mar. 14, 2005), <https://www.cbsnews.com/news/church-police-probe-7-murders/>; Associated Press, *Officials end investigation of deadly church shooting*, StarNews Online (Aug. 3, 2005), <http://www.starnewsonline.com/news/20050803/officials-end-investigation-of-deadly-church-shooting>.
- 173 The high casualty rate in the Las Vegas shooting likely is attributable not only to the use of a bump stock, but also to crowd density and shooter elevation, making it difficult for victims to find cover. The significant loss of accuracy with the use of a bump stock may explain the much higher ratio of injuries to fatalities (9:1) in the Las Vegas shooting when compared to the next four deadliest mass shootings (2:1). *See* Jacob Sullum, *Did Bump Stocks Make the Las Vegas Shooting Deadlier?*, Reason Hit & Run Blog (Oct. 3, 2017), <http://reason.com/blog/2017/10/03/did-bump-stocks-make-the-las-vegas-shoot>.
- 174 *District of Columbia v. Heller*, 554 U.S. 570, 701, 704 (2008).
- 175 Gary Kleck, *Large-Capacity Magazines and the Casualty Counts in Mass Shootings: The Plausibility of Linkages*, 17 Just. Res. & Pol'y 28, 44 (2016).
- 176 *Id.* at 43.
- 177 *Heller*, 554 U.S. at 629; *see* *Kolbe v. Hogan*, 849 F.3d 114, 158 (4th Cir. 2017) (Traxler, J., dissenting) (“[I]f the majority is correct that the semiautomatic AR-15’s rate of fire makes it a weapon of war outside the scope of the Second Amendment, then all semiautomatic firearms—including the vast majority of semiautomatic handguns—enjoy no constitutional protection since the rate of fire for any semiautomatic firearm is determined by how fast the shooter can squeeze the trigger. Such a conclusion obviously flies in the face of *Heller*, which never mentions rate of fire as a relevant consideration.”).
- 178 *See* *Kolbe*, 849 F.3d at 137 (discussing statutory defining features). For additional discussion of these features and other features, *see* Kopel, *supra* note 135, at 388-400.
- 179 *See, e.g., Report on Bill 17-843, supra* note 154 (attachment of testimony of Brian J. Siebel, Oct. 1, 2008), <http://dcclims1.dccouncil.us/images/00001/20090513152155.pdf>.
- 180 *Id.*
- 181 *Heller v. District of Columbia (Heller II)*, 670 F.3d 1244, 1262-63 (D.C. Cir. 2011).
- 182 *Kolbe*, 849 F.3d at 125 (citing J.A. 1121) (1994 United States House of Representatives Committee on the Judiciary Report No. 103-489 favoring H.R. 4298, the proposed federal “assault weapons” ban (citing testimony from John McGaw, Director of BATF, and John Pitta, National Executive Vice President, Federal Law Enforcement Officers Association, both of whom supported the ban)).

- 183 *Id.* at 137; N.Y. State Rifle & Pistol Ass'n v. Cuomo, 804 F.3d 242, 262 (2d Cir. 2015).
- 184 *See* 26 U.S.C. § 5845(f) (2018).
- 185 *N.Y. State Rifle & Pistol Ass'n*, 804 F.3d at 262.
- 186 *See* Christopher Koper, *An Updated Assessment of the Federal Assault Weapons Ban: Impacts on Gun Markets and Gun Violence, 1994-2003* 80 n.94 (June 2004) ("While it is conceivable that changing features of AWs other than their magazines might prevent some gunshot victimizations, available data provide little if any empirical basis for judging the likely size of such effects."). Koper was an expert witness for the state in *Kolbe* and submitted this report as an exhibit to his declaration.
- 187 *Richmond Boro Gun Club, Inc. v. City of New York*, 97 F.3d 681, 695 (2d Cir. 1996).
- 188 *Heller v. District of Columbia*, 670 F.3d 1244, 1262-63 (D.C. Cir. 2011) (*Heller II*) (internal quotations omitted).
- 189 *N.Y. State Rifle & Pistol Ass'n, Inc. v. Cuomo*, 990 F. Supp. 2d 349, 370 (W.D.N.Y. 2013), *aff'd in part, rev'd in part*, 804 F.3d 242 (2d Cir. 2015).
- 190 *See* Armalite Technical Note 54, <https://web.archive.org/web/20120905024032/http://www.armalite.com/images/Tech%20Notes%20C5Tech%20Note%2054,%20Gas%20vs%20Op%20Rod%20Drive,%20020815.pdf> ("The Stoner system provides a very symmetric design that allows straight line movement of the operating components. This allows recoil forces to drive straight to the rear."); Poyer, *supra* note 80 at 15-16 ("Stoner added a straight-line stock ... that allowed the barrel, receiver, bolt and bolt carrier and recoil spring to operate in a straight line from the muzzle to the shooter's shoulder to produce less muzzle jump and felt recoil.").
- 191 United States Department of Defense, Advanced Research Projects Agency (ARPA), *Report of Task No. 13A, Test of Armalite Rifle, AR-15* at 2 (1962), <http://www.dtic.mil/dtic/tr/fulltext/u2/343778.pdf> (emphasis added).
- 192 *Id.* at iii, 2, 3, 9.
- 193 The U.S. Army teaches a pointed "quick fire" technique while holding the weapon at the soldier's side when confronted with "close, suddenly appearing, surprise enemy targets; or when close engagement is imminent," but "only when a target cannot be engaged fast enough using the sights in a normal manner." Army Rifle Marksmanship Manual, *supra* note 60, at 7-19 to 7-21.
- 194 Eugene Volokh, "Do Pistol Grips Make Semi-Automatic Rifles More Dangerous, Because They 'Aid Shooters when 'Spray Firing' from the Hip'?", *The Volokh Conspiracy*, The Washington Post (Jan. 2, 2014), <http://volokh.com/2014/01/02/pistol-grips-make-semi-automatic-rifles-dangerous-aid-shooters-spray-firing-hip/>.
- 195 Koper, *supra* note 186, at 80 n.94.
- 196 The vast majority of AR-15s have a gas-impingement system, which uses a small stainless steel gas tube running over the top of the barrel to force some of the pressurized gases pushing the projectile out of the barrel back into the upper receiver to cycle the action. Some AR-15s use a piston-driven system, which forces the pressurized gases to drive a piston located above the barrel that cycles the action. The handguard provides a protective cover for both of these systems.
- 197 *Kolbe*, 849 F.3d at 125 (quoting J.A. 1121).

- 198 The U.S. Army Training Circular 3-22.9 describes the process as follows:
- Convection cooling ... requires the presence of a moving air current. The moving air has greater potential to carry away heat. The hand guards and ARS [adaptive rail system] of the rifle and carbine are designed to facilitate air movement. The heat shield [in the handguard] reflects heat energy away from the hand guard and back towards the barrel. The net effect is an updraft that brings the cooler air in from the bottom. This process establishes a convection style as heated air is continually replaced by cooler air.
- Army Rifle and Carbine Training Circular, *supra* note 59, at 2-13.
- 199 Army Operators Manual, *supra* note 136, at 0002 00-1 to 002 00-2.
- 200 The buttstock of these rifles contains a buffer and recoil spring necessary for the action to cycle. AR-15s are almost never sold with folding stocks because they cannot fire more than one round with the stock folded.
- 201 Chris Beekman, *supra* note 113.
- 202 N.Y. State Rifle & Pistol Ass'n v. Cuomo, 990 F. Supp. 2d 349, 370 (W.D.N.Y. 2013).
- 203 Daniel Webster Decl. at J.A. 288, *Kolbe v. Hogan*, 849 F.3d 114 (4th Cir. 2017) (No. 14-1945); *see also* James Johnson Decl. at J.A. 224, *id.* (sworn declaration from James Johnson, Baltimore County police chief, stating that “[c]ollapsible or folding stocks aid in the concealment of high-powered assault weapons”).
- 204 Flash suppressors are not very effective in reducing flash seen by night vision optics. *See* Patrick Sweeney, *Gunsmithing the AR-15* 92-93 (2010) (“the heat is still released, and even the most effective flash hider does little to decrease the flash seen by night vision optics”) (“[N]ight vision gear is very sensitive to near-IR and IR frequencies. Even the best flash hidere show a lot of flash to night vision gear.”).
- 205 *See id.* at 92 (“[C]alling the A2 a compensator, to dampen the felt recoil of the AR, is like saying opening your car's door and pressing your shoe against the pavement is a braking system. It can work, but at most speeds you aren't going to notice much decrease in your vehicle's velocity. In most shooting situations you aren't going to notice much, if any, decrease in muzzle movement due to the A2 flash hider.”).
- 206 *See, e.g., AR 15 Muzzle Brake vs. Flash Hider vs. Compensator - What is the Best Muzzle Device?*, AT3Tactical (Sept. 19, 2018 8:31 AM), <https://www.at3tactical.com/blogs/news/10797809-what-is-the-best-muzzle-device-for-my-ar-15-muzzle-brake-vs-flash-hider-vs-compensator> (noting that flash suppressors provide “[n]o recoil or accuracy increasing benefits”).
- 207 Steve Felgenhauer, *Flash Hiders & Compensators*, Military.com (2018), <https://www.military.com/outdoor-guide/flash-hiders-and-compensators.html>.
- 208 *See* Long, *supra* note 79, at 261 (“A flash hider ... has an added plus of protecting a barrel from dings and damage; this is important because damage to the muzzle can quickly ruin accuracy. Consequently, even sport shooters who don't need to reduce flash will discover that a flash hider ... makes good sense on an AR-15.”).
- 209 Tom Diaz, *Bullet Hoses - The Gun Industry's Lies*, Chapter in Diaz, *supra* note 16.

- 210 Aftermarket manufacturers sell 60-round and 100-round magazines for civilian AR-15s. They come in box and drum versions, the latter being highly prone to jamming. The weight and size of these larger magazines can degrade the AR-15's accuracy by making it more difficult to handle effectively.
- 211 Koper, *supra* note 186, at 80.
- 212 See generally David B. Kopel, *The History of Firearms Magazines and Magazine Prohibitions*, 88 Albany L. Rev. 849 (2015).
- 213 See David B. Kopel, *The Cost and Consequences of Gun Control*, Cato Institute Policy Analysis 6-9 (No. 784) (Dec. 1, 2015), <https://www.cato.org/publications/policy-analysis/costs-consequences-gun-control>; Tomislav Kovandzic & Gary Kleck, *Banning Large Capacity Magazines: A Solution to a Nonexistent Problem*, <https://www.utdallas.edu/~tvk071000/Banning%20Large%20Capacity%20Magazines%20Will%20Not%20Reduce%20Crime.pdf> (last visited July 3, 2018).
- 214 *Kolbe v. Hogan*, 849 F.3d 114, 125 (4th Cir. 2017) (citing J.A. 1121 (1994 United States House of Representatives Committee on the Judiciary Report No. 103-489 favoring H.R. 4298, the proposed federal "assault weapons" ban) (testimony from John McGaw, Director of BATF, and John Pitta, National Executive Vice President, Federal Law Enforcement Officers Association, both of whom supported the ban)).
- 215 *Id.* at 158 (Traxler, J., dissenting).
- 216 Ashley Cannon, *Mayhem Multiplied: Mass Shooters and Assault Weapons*, Citizens Crime Commission of New York City (2016), <http://www.nycrimecommission.org/pdfs/CCC-MayhemMultiplied-June2016.pdf>.
- 217 *Id.*
- 218 *Id.*
- 219 *Id.*
- 220 *Kolbe*, 849 F.3d at 125 (quoting the Brady Center's Brian Siebel at J.A. 1151).
- 221 *Id.* at 127, 128.
- 222 *Id.* at 128 (citing Batts Decl. ¶ 49 at J.A. 266).
- 223 See Aaron Bandler, *Debunking Top 5 Myths About the AR-15*, The Daily Wire, (June 20, 2016), <https://www.dailywire.com/news/6749/debunking-top-5-myths-about-ar-15-aaron-bandler> (explaining that since an AR-15 is a semi-automatic, it can only fire the amount of times somebody pulls the trigger).
- 224 See, e.g., T.Rex Arms, *2 Second Rifle Speed Reload Standard*, <https://www.youtube.com/watch?v=2Q-QVBQVYTA>; Milspec_Mojo, *How I Like to Speed Reload an AR-15*, https://www.youtube.com/watch?v=aT_bSGJ8j9o; maddhatter11111, *Marine speed reloading M4 2*, <https://www.youtube.com/watch?v=Hx0JzYcwUiY&frags=pl%2Cwn>.

- 225 See, e.g., Sandy Hook Report, *supra* note 160, at 21-22, (explaining that the Newtown shooter emptied three 30-round magazines but did not wait until two other 30-round magazines were empty to change them).
- 226 Kleck, *supra* note 175. Kleck defined LCMs as magazines holding more than 10 rounds. *Id.* at 33.
- 227 *Id.* at 32.
- 228 *Id.* at 39-40. Kleck noted that there were conflicting eyewitness reports about whether the Tucson shooter was trying to reload or his gun had jammed. *Id.*
- 229 *Id.* at 40.
- 230 *Id.* at 37. Kleck used the six-victim cutoff because a shooter could shoot as many as six persons with a six-shot revolver. Since the rationale for LCM bans is that they enable the shooter to fire more rounds without reloading and thus kill or injure more victims, Kleck explained, a lower numerical cutoff would have included more incidents in which the LCM likely had no effect on the number of victims. *Id.* at 33.
- 231 *Id.* at 40-42.
- 232 *Id.* at 42.
- 233 *Id.*
- 234 *Id.* at 42-44. Kleck's list of mass shootings involving known rates of fire included 17 of 23 incidents from his prior list in which information was available on the duration and number of rounds fired, plus an additional eight mass shootings that did not involve known LCM use for which such information was available. *Id.* at 43.
- 235 *Id.* at 42-44.
- 236 *Id.* at 44.
- 237 *Id.*
- 238 *Id.* at 44-45. See Volokh, *supra* note 119, at 1489 ("[M]ass shootings ... usually progress over the span of several minutes or more. Given that removing a magazine and inserting a new one takes only a few seconds, a mass murderer--especially one armed with a backup gun--would hardly be stymied by the magazine size limit. It's thus hard to see large magazines as materially more dangerous than magazines of normal size.").
- 239 Kleck, *supra* note 175, at 45.
- 240 The district court in *Duncan v. Becerra*, 265 F. Supp. 3d 1106, 1122, 1129-30 (S.D. Cal. 2017), noted how several state experts defending the LCM ban conceded that supporting data is missing. For example, Daniel Webster, a professor of public health and gun violence researcher who also submitted an affidavit in *Kolbe*, stated that "[t]o date, there are no studies that have examined separately

the effects of an assault weapons ban, on the one hand, and an LCM ban, on the other hand” *Id.* at 1129 (quoting ¶ 25 in Webster’s declaration) (internal quotations and emphasis omitted).

241 *Kolbe v. Hogan*, 849 F.3d 114, 128 (4th Cir. 2017).

242 *Id.* at 120 (“Nine terrified children ran from one of the classrooms when the gunman paused to reload”); *id.* at 128 (“[N]ine children were able to run from a targeted classroom while the gunman paused to change out a large-capacity thirty-round magazine.”).

243 See, e.g., Associated Press, *Little hero of Sandy Hook saved his pals*, New York Post (Oct. 19, 2013), <https://nypost.com/2013/10/19/sandy-hooks-littlest-hero-slain-kid-urged-others-to-run/> (noting that the story was based on statements from the mother of the child who heroically urged his classmates to run when the shooter paused).

244 Sandy Hook Report, *supra* note 160, at 10.

245 Dave Altimari & Steven Goode, *Details Emerge on Sandy Hook Shooting, Items Found In Lanza Rooms*, The Hartford Currant (Oct. 19, 2013), <http://www.courant.com/news/connecticut/hc-sandy-hook-shooting-details-20131018-story.html>. See also Corinne Lestch, *Slain Newtown boy Jessie Lewis, 6, yelled ‘run!’ when Adam Lanza’s gun jammed, allowing six classmates to run to safety*, New York Daily News (Oct. 19, 2013), <http://www.nydailynews.com/news/national/slain-newtown-boy-yelled-classmates-run-6-escaped-article-1.1490325>.

246 Edmund H. Mahony, et al. *Sandy Hook Shooter’s Pause May Have Aided Students’ Escape*, The Hartford Currant (Dec. 23, 2012), <http://www.courant.com/news/connecticut/newtown-sandy-hook-school-shooting/hc-landa-gunjam-20121222-story.html>.

247 *Id.*

248 *Id.*

249 *Kolbe v. Hogan*, 849 F.3d 114, 128 (4th Cir. 2017).

250 See *Aurora Century 16 Theater Shooting: After Action Report for the City of Aurora* 12-13, TriData Division, (April 2014), <https://justiceclearinghouse.com/wp-content/uploads/2017/10/C16-AAR.pdf> (indicating that the shooter fired 65 rounds from the rifle until it jammed); see also James Dao, *Aurora Gunman’s Arsenal: Shotgun, Semiautomatic Rifle and, at the End, a Pistol*, The New York Times (July 23, 2012), <https://www.nytimes.com/2012/07/24/us/aurora-gunmans-lethal-arsenal.html>; Susan Candiotti, *Source: Colorado shooter’s rifle jammed during rampage*, CNN (July 22, 2012), <https://www.cnn.com/2012/07/22/us/colorado-shooting-investigation/>; Phil Tenser, *Aurora police testify in James Holmes’ trial: 240 ballistic impacts found after theater shooting*, ABC 7 Denver (May 12, 2015), <https://www.thedenverchannel.com/news/movie-theater-shooting/aurora-police-department-crime-scene-investigators-found-76-spent-rounds-after-theater-shooting>.

251 Johnson Dep. at J.A. 2442, *Kolbe*, 849 F.3d 114 (No. 14-1945).

252 *Kolbe*, 849 F.3d at 128.

253 For reports that the Tucson shooter’s handgun jammed, see Sam Quinones & Michael Muskal, *Jared Loughner to be charged in Arizona shootings targeting Gabrielle Giffords*, Los Angeles Times (Jan. 9, 2011), <http://articles.latimes.com/2011/jan/09/nation/la-na-0110-gabrielle-giffords-20110110>; Joseph A. W. Fitzgerald, *Sheriff Releases Photos of ‘11 Tucson Shooting*, The New York

Times Student Journalism Institute (May 23, 2013), <http://tucson13.nytimes-institute.com/2013/05/23/sheriff-releases-photos-of-11-tucson-shooting/>.

- 254 The state in *Kolbe* presented news reports of multiple incidents in which shooters were stopped while reloading. *See* Brief of Defendant in Support of Motion for Summary Judgment Ex. 40 at J.A. 1326-67, *Kolbe*, 849 F.3d 114 (No. 14-1945).
- 255 *See* Andrew R. Morral, et al., The Science of Gun Policy: A Critical Synthesis of Research Evidence on the Effects of Gun Policies in the United States, Rand Corporation 61-72 (2018) (concluding that available evidence is inconclusive that “assault weapon” bans have any effect on mass shootings or firearm homicides).

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EXHIBIT 14

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ADVANCED RESEARCH PROJECTS AGENCY
Washington 25, D. C.

20 August 1962

To: Addressees
From: OSD/ARPA

Subject: Field Test Report, AR-15 Armalite Rifle
Enclosure: Final Report, OSD/ARPA Research and Development Field Unit - Vietnam

1. The AR-15 Armalite rifle has been subjected to a comprehensive field evaluation under combat conditions in Vietnam. The results of this evaluation, contained in the attached report, are forwarded for your information.

2. Because of the controversy which has surrounded this weapon, particular care was exercised to insure that the tests were objective, thorough and adequately documented, and to insure that valid data and conclusions were derived therefrom.

3. The suitability of the AR-15 as the basic shoulder weapon for the Vietnamese has been established. For the type of conflict now occurring in Vietnam, the weapon was also found by its users and by MAAG advisors to be superior in virtually all respects to the - a. M-1 rifle, b. M-1 and M-2 Carbines, c. Thompson Sub-machine gun and d. Browning Automatic rifle.

4. Test data derived from recent Service evaluations of the AR-15 in the U.S. support the technical conclusions of the report. The Central Intelligence Agency has conducted similar tests; it is understood that the results of that evaluation are essentially identical to those contained in the report.

5. Photographs 7 and 8, Appendix D, pictures of Viet Cong KIA showing the wound effect of the AR-15 bullet, were deleted from the attached report by this office.

6. The conclusions and recommendations of this report have been made available to COMUSMACV and CINCPAC by the originator and to DOD and CIA by OSD/ARPA.

R. C. Phelps
R. C. Phelps

Asst Director, for AGILE

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RESEARCH & DEVELOPMENT FIELD UNIT
Advanced Research Projects Agency
Office of the Secretary of Defense
APO 143, San Francisco, California

MACRD

31 July 1962

SUBJECT: Report of Task No. 13A, Test of Armalite Rifle, AR-15 (U)

THRU. Commander (3)
U. S. Military Assistance Command, Vietnam
APO 143, San Francisco, California

TO: Commander in Chief, U. S. Pacific (3)
c/o Fleet Post Office
San Francisco, California

Advanced Research Projects Agency (3)
Office of the Secretary of Defense
The Pentagon
Washington 25, D. C.

1. (C) Forward herewith is the final report of the test of the Armalite Rifle (AR-15). It should be noted that the report proper in its present form reflects the views of the U. S. element of CDTC only. It is being handled in this fashion to avoid the inference that the Vietnamese, in seeking a newer weapon, might have influenced the recommendations in the report.

2. (C) However, combat evaluations in Vietnam are necessarily joint ventures and the results must be made known to appropriate GVN authorities. This report will now be coordinated with the Vietnamese element in CDTC and will be officially closed out as a combined report. It is thought that this is unlikely to

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result in any substantive change in the report as now written.

**1 Incl.
AR-15 Report w/5 Annexes**

**WILLIAM P BROOKS, JR.
Colonel, Arty
Chief**

**Copies furnished:
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**RESEARCH & DEVELOPMENT FIELD UNIT
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REPORT OF TASK NO. 13A

TEST OF

ARMALITE RIFLE. AR-15 (U)

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REPORT OF TASK NO. 13A TEST OF ARMALITE RIFLE, AR-15 (U)

1. (U) REFERENCES.

- a. (U) OSD Message, DEF 907037, DTG 122354Z December 1961.
- b. (U) MACRD Message 367, DTG 050203Z June 1962.
- c. (U) US Army Infantry Board Report of Project 2787, 27 May 1958, Subject: Evaluation of Small Caliber, High Velocity Rifle - Armalite (AR-15).
- d. (U) Final Report, Lightweight High Velocity Rifle Experiment, US Army Combat Development Experimentation Center, Fort Ord, California, dtd 30 May 1959.
- e. (U) Evaluation Report of the Colt Armalite AR-15 Automatic Rifle, US Air Force Marksmanship School, Lackland AFB, Texas, dtd 22 September 1960.
- f. (U) Report No. DPS-96, A Test of Rifle, Caliber .223, AR-15, Aberdeen Proving Ground, Maryland, dtd 9 January 1961.
- g. (U) Fourth Report on the Test of the US Carbine, Cal. .30, M1, ORD Program #4972, Aberdeen Proving Ground, Maryland, dtd 13 Aug 1942.
- h. (U) First Report on Test of Production Models of the Carbine, Cal .30, M2, ORD Program #4972, Aberdeen Proving Ground, dtd 1 Aug 1945.
- i. (U) US Army Infantry Board Supplemental Report of Project No 2787, "Evaluation of Small Caliber, High Velocity Rifles - Armalite (AR-15)", dtd 13 August 1958.

2. (C) PURPOSE.

The purpose of this test was to determine if the AR-15 Rifle is compatible with the small stature, body configuration and light weight of the Vietnamese Soldier and to evaluate the weapon under actual combat

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conditions in South Vietnam. At the request of MAAG, Vietnam, the scope of the test was expanded to include a comparison between the AR-15 and the M2 Carbine to determine which is a more suitable replacement for other shoulder weapons in selected units of the Republic of Vietnam Armed Forces (RVNAF).

3. (U) DESCRIPTION OF MATERIEL:

The AR-15 Rifle is a lightweight, gas-operated rifle equipped with a 20-round, detachable magazine. It is chambered for Cartridge, Caliber .223. When fired in the rifle, this round gives the 55 grain bullet a muzzle velocity of 3200 feet per second. It has a plastic stock with a rubber butt, assembled in line with the bore. This, in conjunction with its high line of sight and separate hand grip, is designed to minimize rotation about the shoulder during firing. The two piece upper hand guard is made of metal and plastic and is designed for easy disassembly and rapid dissipation of heat. A lever above the grip on the left side of the receiver provides a selector for the trigger safety, semi-automatic and automatic fire. A bolt catch holds the bolt to the rear after the last round has been fired. A cover is provided for the ejection port in the receiver. A three-pronged muzzle attachment, threaded to the barrel, serves as a flash suppressor, grenade launcher, and a front support for a bayonet. The lower part of the front sight is machined to form a bayonet lug. Standard accessories include: Bayonet w/scabbard; bipod w/case; grenade-launching sight; and a cleaning rod. Photographs of the weapon appear in Annex "D".

4. (C) BACKGROUND.

a. (U) The problem of selecting the most suitable basic weapon for the Vietnamese soldier is complicated by his small stature and light weight. The average soldier stands five feet tall and weighs ninety pounds. Principle US weapons presently issued to Vietnamese troops include the M1918A2; the Thompson Sub-Machine Gun, Caliber .45; and the US Carbine, Caliber .30, M1.

b. (U) Because of its availability and the results of extensive studies and previous testing by military agencies, the Colt Armalite AR-15 Rifle was selected in July 1961 as the most suitable weapon for initial tests. This weapon was developed by the Armalite Division of Fairchild Aircraft Corporation to meet the military characteristics for a lightweight rifle utilizing the high velocity small caliber principle. It was first tested by the US Army Infantry Board in 1958 (Ref 1.c.). Since then, the weapon

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and its ammunition have undergone extensive engineering and service tests by: Aberdeen Proving Ground; the Combat Development Experimentation Center, Fort Ord, California; and the US Air Force at Lackland Air Force Base, Texas, (Refs l.d., l.e., l.f.). The rifle, with several modifications resulting from these tests, is presently being manufactured by Colt's Patent Firearms Manufacturing Company, Hartford, Connecticut. (Prior to completion of this report, the U. S. Air Force adopted the AR-15 as its basic shoulder weapon, replacing the M2 Carbine, the Browning Automatic Rifle and the M3 Sub-Machine Gun).

c. (C) Based upon favorable observations of the AR-15 by both US Advisors and RVNAF Commanders following limited firing demonstrations conducted in Vietnam during August 1961, weapons were requested in numbers sufficient to conduct a full scale combat evaluation of the AR-15 by selected units of the RVNAF. In December 1961, the Secretary of Defense approved the procurement of 1000 AR-15 Rifles, necessary ammunition, spare parts and accessories for evaluation.

d. (C) OSD/ARPA negotiated a contract with the firm of Cooper-MacDonald, Inc., Baltimore, Maryland, for procurement and air shipment of all materiel. The first shipment was received on 27 January 1962 and subsequent increments arrived approximately every three weeks until the contract was fulfilled on 15 May 1962. Operational evaluation and testing began on 1 February and terminated on 15 July 1962.

5. (C) SUMMARY OF TESTS:

a. (C) General.

(1) (C) To accomplish the stated purpose of this test, it was divided into two parts. One part was a combat evaluation of the AR-15 in which the weapons were issued to specially selected ARVN Units for use in their operations against the Viet Cong. Along with the rifles and ammunition, Vietnamese Unit Commanders and US Military Advisors were given weapon preference and operational questionnaires and requested to complete and return them after training and combat use of the AR-15. Samples of these questionnaires appear as Appendices 1, 2, and 3 of Annex "A".

(2) (C) The other part of the test consisted of a comparison between the AR-15 Rifle and the M2 Carbine. Areas in which the two weapons were compared included: physical characteristics; ease of disassembly and assembly; marksmanship ability at known distances, semi-automatic and automatic fire; marksmanship ability at unknown distances, semi-

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automatic and automatic fire; ruggedness and durability; adequacy of safety features; effects of open storage in a tropical environment; ability to penetrate dense brush and heavy foliage; and, the individual Vietnamese soldier's preference between the two weapons.

b. (C) Results, Combat Evaluation.

(1) (C) For detailed report see Annex "A".

(2) (C) Summary. The Vietnamese Unit Commanders and US Advisors who participated in the evaluation consider the AR-15 Rifle to be a more desirable weapon for use in Vietnam than the M1 Rifle, BAR, Thompson Sub-Machine Gun, and M1 Carbine for the following reasons:

(a) (C) It is easier to train the Vietnamese troops to use the AR-15 than the M1 Rifle, BAR, M1 Carbine, or the Sub-Machine Gun.

(b) (C) The AR-15's physical characteristics are well suited to the small stature of the Vietnamese soldier (see photographs 1 and 2, Annex "D").

(c) (C) It is easier to maintain the AR-15 both in the field and in garrison than the M1 Rifle, BAR, Sub-Machine Gun, or the M1 Carbine.

(d) (C) The ruggedness and durability of the AR-15 are comparable to that of the M1 Rifle and superior to that of the BAR, Sub-Machine Gun, and M1 Carbine.

(e) (C) The AR-15 imposes less logistical burden than any of the four principal weapons presently being used by Vietnamese Forces.

(f) (C) The AR-15 is tactically more versatile than any present weapon being used by Vietnamese Forces.

(g) (C) In semi-automatic fire, the accuracy of the AR-15 is considered comparable to that of the M1 Rifle, and superior to that of the M1 Carbine.

(h) (C) In automatic fire, the accuracy of the AR-15 is considered comparable to the Browning Automatic Rifle and superior to the Sub-Machine Gun.

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c. (C) Results, Comparison Test of the AR-15 Rifle and the M2 Carbine.

(1) (C) For detailed report see Annex "B".

(2) (C) Summary:

(a) (C) Test #1, Comparison of physical characteristics

(i) (C) The AR-15 is comparable to the M2 Carbine in size and weight.

(ii) (C) The addition of an integral grenade launcher, telescope mount, and an accessory bipod the AR-15 Rifle capabilities that the M2 Carbine does not possess at present and attainment of which would require modification of the weapon (see photograph 3, Annex "D").

(iii) (C) Both the AR-15 and the M2 Carbine are compatible with the light weight and diminutive stature of the Vietnamese soldier (see photographs 4 and 5, Annex "D").

(b) (C) Test #2, Comparative ease of disassembly and assembly.

(i) (C) The AR-15 is simpler than the M2 Carbine and requires less time to disassemble and re-assemble for normal field c. abing (see photograph 6, Annex "D").

(ii) (C) The average Vietnamese soldier can be trained in the disassembly and assembly of the AR-15 in less time than for the M2 Carbine.

(c) (C) Test #3, Marksmanship ability, known distance.

(i) (C) The ARVN soldier's ability to deliver accurate semi-automatic fire at known distances up to 200 meters with the AR-15 and the M2 Carbine is comparable. (It is noted that a higher percentage of test participants fired qualifying scores with both the AR-15 and the M2 Carbine than with the M1 Rifle.)

(ii) (C) The ARVN soldier can deliver far more accurate automatic fire at known distances up to 200 meters with the AR-15 than he can with the M2 Carbine.

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(d) (C) Test #4, Marksmanship ability, unknown distance.

(i) (C) The ARVN soldier's ability to deliver accurate semi-automatic fire on targets of unknown range using the AR-15 and the M2 Carbine is comparable.

(ii) (C) The ARVN soldier can deliver more accurate automatic fire on targets of unknown range with the AR-15 than he can with the M2 Carbine.

(e) (C) Test #5, Comparative ruggedness and durability

(i) (C) The AR-15 is more durable than the M2 Carbine under conditions that require prolonged firing.

(ii) (C) The AR-15 will stand up to rough handling normally encountered in combat situations better than the M2 Carbine.

(f) (C) Test #6, Comparison of the adequacy of safety features.

(i) (C) The safety features on the AR-15 and the M2 Carbine are comparable with regard to their adequacy and the ARVN soldier's ability to understand how they function.

(ii) (C) The location of a single selector switch, which combines the functions of safety and type of fire selector, on the left side of the AR-15's receiver where it is easily accessible to the thumb, enables the ARVN soldier to get the first round off faster with the AR-15 than he can with the M2 Carbine. He must manipulate the safety selector on the M2 Carbine with his trigger finger, then return it to the trigger to fire. With the AR-15, he can keep his finger on the trigger while manipulating the safety selector with his thumb.

(g) (C) Test #7. Effects of open storage in a tropical environment.

(i) (C) The functioning capability of the AR-15 is less affected by prolonged exposure to tropical weather than that of the M2 Carbine.

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(h) (C) Test #8, Brush penetration

(i) (C) The trajectory of the AR-15 bullet is not significantly affected when fired through dense underbrush at ranges up to 50 meters.

(ii) (C) The AR-15 round will penetrate jungle undergrowth equally as well as the M2 Carbine round at ranges up to 50 meters.

(i) (C) Test #9, Troop opinion poll

(i) (C) The great majority of the ARVN soldiers who participated in the comparison test prefer the AR-15 to the M2 Carbine.

6. (C) DISCUSSION:

a. (C) The extremely mobile type of offensive warfare being stressed by US Advisors in Vietnam and the small stature and light weight of the Vietnamese soldier place a high premium on small, lightweight weapons. In addition, the violent short clashes at close ranges which are characteristic of guerrilla warfare in Vietnam make it highly desirable to have a dependable weapon capable of producing a high rate of accurate and lethal full automatic fire.

b. (C) From the viewpoint of standardization and simplicity of training and the resultant long range reduction of the logistics burden, characteristics of existing weapons were studied to determine if a single weapon could be found that would meet the requirements for a basic shoulder weapon for Vietnamese troops. It is believed that such a weapon should encompass the following desirable characteristics of individual weapons:

- (1) The effective range of the M1 Rifle.
- (2) The light weight and small size of the M1 Carbine.
- (3) The full automatic capability of the BAR.
- (4) The simplicity of the SMG.

Other highly desirable, if not mandatory, features would include a bayonet, grenade launching and sniper capability.

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c. (C) The AR-15 appeared to more nearly satisfy the above prescribed characteristics than any other US weapon. The import of the AR-15 weapon/ammunition weight for units that conduct extended operations without normal resupply capabilities can be seen in comparing the 24 lb. weight of an M1 with a battle load of 220 rounds of ammunition with the 12 lb. weight of the AR-15 with 220 rounds. This weight difference equals approximately 430 rounds of AR-15 ammunition.

d. (C) The Comparison Test (Annex "B") shows the AR-15 to be distinctly superior to the M2 Carbine. Although the M2 Carbine is sufficiently light for use by the Vietnamese soldier, it does not possess the essential characteristics of a basic weapon for offensive warfare. It lacks the effective range of the M1 Rifle and has a high malfunction rate (Ref l. e. and l. h.). However, it is apparently available and was considered by MAAG as the prime competitor against the AR-15.

e. (C) The Combat Evaluation (Annex "A") shows that all US Advisors and Vietnamese Commanders who participated in the evaluation prefer the AR-15 to any other weapon with which the RVNAF are now armed. The lethality of the AR-15 and its reliability record were particularly impressive. All confirmed casualties inflicted by the AR-15, including extremity hits, were fatal (see photographs 7 and 8, Annex "D"). The high degree of reliability and trouble-free performance of the weapon reflected in previous test reports (Ref l. c., l. d., and l. f.) was also noteworthy during the testing and evaluation here. No parts breakage was encountered while firing approximately 80,000 rounds during the Comparison Test. Only two parts have been issued to date to replace breakage for the entire 1,000 weapons. Stoppages on the AR-15 are easily cleared by the individual soldier through the application of "immediate action".

f. (C) A thorough review of the numerous stateside AR-15 test reports referenced in paragraph 1 reveals nothing which would make the foregoing views unsound. The reported poor performance of the AR-15 under cold weather conditions is of no concern in Vietnam. The widely held view that the AR-15 operates poorly under rainy conditions was disproved in the weapon's second test by Aberdeen Proving Ground (Ref l. f.). Those results were confirmed here during field operations. No deficiencies in the weapon requiring correction prior to adoption were found during the test in Vietnam, although two minor changes are recommended for product improvement. These recommendations appear in Annex "C".

g. (C) The combat evaluation part of this test is somewhat subjective since it is based on the individual judgments of many users. It is

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believed, however, that the professional judgments of the senior US Advisors and Vietnamese Commanders of the units testing the weapon, all of whom are mature, experienced soldiers, does provide for a sound combat appraisal.

h. (C) From an operational viewpoint, it is believed that the tests conducted in Vietnam show the superiority of the AR-15 over the M2 Carbine and over other weapons now issued to RVNAF. It is believed that the decision as to what units might be issued the AR-15 or which weapons the AR-15 might replace is dependent on cost and logistical factors which are beyond the purview of this unit.

7. (C) CONCLUSIONS: It is concluded that:

a. (C) The AR-15 is more compatible with the light weight and small stature of the Vietnamese soldier than the M1 Rifle, the Browning Automatic Rifle, and the Thompson Sub-Machine Gun.

b. (C) The AR-15 is superior to the M2 Carbine.

c. (C) The M2 Carbine lacks the necessary dependability and versatility for consideration as the basic shoulder weapon for Vietnamese troops.

d. (C) The AR-15 is capable of replacing any or all of the shoulder weapons currently being used by the Armed Forces of the Republic of South Vietnam.

e. (C) The AR-15 is considered by both Vietnamese Commanders and U.S. Military Advisors who participated in the tests as the best "all around" shoulder weapon in Vietnam.

8. (C) RECOMMENDATIONS: It is recommended that:

a. (C) The AR-15 be considered for adoption as the basic weapon for all RVNAF with a view toward improving effectiveness and simplifying training and weapons/logistics systems.

b. (C) Priority for adoption of the AR-15 be given to those units which frequently operate in jungle environment for extended periods because

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of the significant operational and logistical advantages accruing to their having the lightest and most effective weapon/ammunition combination available.

c. (D) The M1 and/or M2 Carbine continue to be issued only to those individuals who, because of their duty or position, can function effectively with a weapon best suited for a defensive role.

ANNEXES:

- A. Combat Evaluation w/3 Appendices**
- B. Comparison Test**
- C. Suggested Corrective Actions**
- D. Photographs 1 through 8**

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CONFIDENTIAL**ANNEX "A"****DETAILS OF THE
COMBAT EVALUATION OF THE AR-15****I. (C) GENERAL.**

Selected Vietnamese Units which had previously been engaged in considerable combat were issued AR-15 Rifles and ammunition for use against the Viet Cong. In addition, each Unit Commander and US Military Advisor with these units was given questionnaires in which he was requested to evaluate the AR-15 in comparison with the other weapons presently used by the RVNAF. (See Appendices 1, 2, and 3 for samples of questionnaires.)

II. (C) DISTRIBUTION OF WEAPONS AND AMMUNITION.

<u>Unit</u>	<u>AR-15 Rifles</u>	<u>Ammunition</u>
7th Infantry Division	100	50,000 rds
Rangers	100	50,000 rds
Airborne Brigade	390	195,000 rds
VN Marines	100	50,000 rds
VN Special Forces	100	50,000 rds
Special Battalions	125	120,000 rds
5th Infantry Division	40	25,000 rds
Father Hoa	10	10,000 rds
Total	<u>965</u>	<u>550,000 rds</u>

III. (C) DETAILS OF TEST.

A. (C) Purpose: To evaluate the performance of the AR-15 Rifle under actual combat conditions and to compare this performance to that of the weapons presently being used by the RVNAF.

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B. (C) Method: Each Unit Commander and US Military Advisor of those units receiving AR-15 Rifles evaluated its performance in combat and compared it to the performance of those weapons presently being used by the RVNAF. Areas in which the AR-15 was evaluated and compared included: training; physical characteristics; ease of maintenance; ruggedness and durability; logistical considerations; accuracy; and tactical versatility. In the questionnaires given them, Commanders and Advisors were instructed to award 5 points to the most desirable weapon, 4 points to the second, 3 points to the third, 2 points to the fourth, and 1 point to the least desirable weapon in each category delineated above.

C. (C) Results: The results from the questionnaires are set forth in the table below and reflect the evaluation of the AR-15 by Commanders and Advisors of most of the different types of tactical units in Vietnam (as listed in paragraph II above). The figures indicate the total number of points awarded to each weapon by Vietnamese Unit Commanders and U.S. Military Advisors in their joint responses to the questionnaires.

1. <u>Training.</u>	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>	<u>Max. Poss.</u>
a. Simplest to train the troops to use	59	44	15	37	55	70
b. Simplest to train in functioning	61	50	15	37	47	70
c. Simplest to train in disassembly and assembly	63	48	14	37	48	70
Total	183	142	44	111	150	210
2. <u>Physical Characteristics</u>	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>	<u>Max. Poss.</u>
a. Easiest for soldier to aim and fire	60	29	17	42	62	70
b. Easiest to carry over open terrain	59	29	14	43	64	70
c. Easiest to carry through jungle terrain	59	29	14	45	63	70
d. Easiest to hold on a target while firing several rounds	69	40	24	24	53	70
Total	247	127	69	154	242	280

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3. <u>Maintenance</u>		<u>M1</u>			<u>M1</u>	<u>Max.</u>
	<u>AR-15</u>	<u>Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>Carbine</u>	<u>Poss.</u>
a. Simplest to disassemble and assemble	65	43	14	39	49	70
b. Easiest to maintain in the field	63	51	16	34	46	70
Total	128	94	30	73	95	140
4. <u>Ruggedness & Durability</u>		<u>M1</u>			<u>M1</u>	<u>Max.</u>
	<u>AR-15</u>	<u>Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>Carbine</u>	<u>Poss.</u>
a. Most rugged weapon	52	59	33	35	31	70
b. Had fewest stoppages or malfunctions during firing	59	59	20	32	39	70
c. Most reliable under all conditions	57	60	28	30	35	70
Total	168	178	81	97	105	210
5. <u>Logistics</u>		<u>M1</u>			<u>M1</u>	<u>Max.</u>
	<u>AR-15</u>	<u>Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>Carbine</u>	<u>Poss.</u>
a. Imposes least logistical burden	66	47	17	30	50	70
Total	66	47	17	30	50	70
6. <u>Tactical</u>		<u>M1</u>			<u>M1</u>	<u>Max.</u>
	<u>AR-15</u>	<u>Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>Carbine</u>	<u>Poss.</u>
a. Easiest to employ	64	40	18	39	49	70
b. Preferred in ambush/counter-ambush situations	69	28	36	48	29	70
c. Preferred against massed troops	65	32	61	33	19	70
d. Tactically most versatile	69	43	38	29	31	70
Total	267	143	153	149	128	280

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7. <u>General</u>	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>	<u>Max. Poss.</u>
a. Preferred by troops	67	28	18	46	51	70
b. Preferred by commanders and advisors	64	33	21	39	43	70
c. Most suited to VN soldier under present tactical condi- tions	67	30	21	42	50	70
d. Most effective at most common range for engaging VC (0-200 meters)	63	46	49	22	30	70
Total	261	137	109	149	174	280

Recapitulation: In all aspects covered, the total ratings for all weapons were as follows:

<u>AR-15</u>	<u>M1Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1Carbine</u>	<u>Maximum Possible</u>
<u>1320</u>	<u>868</u>	<u>503</u>	<u>763</u>	<u>894</u>	<u>1470</u>

8. Accuracy. Advisors and Unit Commanders were requested to evaluate the accuracy of the AR-15 and compare it with other present weapons in both automatic fire and semi-automatic fire. Their evaluation is reflected in the following table:

	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>	<u>Max. Poss.</u>
a. Semi-automatic fire	61	62			45	70
b. Automatic fire	65		57	42		70

9. (C) Remarks. Unit Commanders' and Advisors' remarks concerning the value of the AR-15 to Vietnamese Units and its worth as a combat weapon in the war in South Vietnam as opposed to existing weapons were also requested. Generally, the comments were extremely favorable to the AR-15. All of the comments received are presented below in their entirety and in the form in which they were received.

(1) (C) "On 160900 June 62, one platoon from the 340 Ranger Company was on an operation vic. YT260750 and contacted 3 armed VC in heavily forested jungle. Two VC had carbines, grenades, mines, and one had a

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SMG. At a distance of approximately 15 meters, one Ranger fired an AR-15 full automatic hitting one VC with 3 rounds with the first burst. One round in the head-took it completely off. Another in the right arm, took it completely off, too. One round hit him in the right side, causing a hole about five inches in diameter. It cannot be determined which round killed the VC but it can be assumed that any one of the three would have caused death. The other 2 VC ran, leaving the dead VC with 1 carbine, 1 grenade and 2 mines. " (Rangers)

(2.) (C) "On 9 June a Ranger Platoon from the 40th Inf Regt was given the mission of ambushing an estimated VC Company. The details are as follows:

- a. Number of VC killed: 5**
- b. Number of AR-15's employed: 5**
- c. Range of engagement: 30-100 meters**
- d. Type wounds:**
 - 1. Back wound, which caused the thoracic cavity to explode.**
 - 2. Stomach wound, which caused the abdominal cavity to explode.**
 - 3. Buttock wound, which destroyed all tissue of both buttocks.**
 - 4. Chest wound from right to left, destroyed the thoracic cavity.**
 - 5. Heel wound, the projectile entered the bottom of the right foot causing the leg to split from the foot to the hip.**

These deaths were inflicted by the AR-15 and all were instantaneous except the buttock wound. He lived approximately five minutes.

The following is a list of minor deficiencies noted during this period:

- a. The stock and heat deflector will reflect light. This light is visible for approximately 150 feet at night.**
- b. A brass brush is needed to remove carbon from the bolt carrier. " (Rangers)**

(3.) (C) "72 AR-15 Rifles were carried into this action (airborne assault). The drop zone was barely acceptable and many troops landed in high trees. Several LMG's and BAR's were not operational after the drop. Only one AR-15 was reported slightly damaged (damaged pistol grip) and all were operational. Throughout the entire operation, which lasted 6 days and covered over 40 kilometers of difficult terrain including dense jungle and frequent water crossings, the weapons (AR-15) held up exceptionally well. " (Airborne Brigade)

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(4.) (C) "The AR-15 proved to be an effective weapon on this operation for the following reasons:

a. The weapon held up very well on the paratroop which took place on a small drop zone surrounded by dense forests. Landings of the troopers were much rougher than normal. Many troops landed in high trees. This subjected the individual weapons to a much more severe test than usual. Some of the LMG's and BAR's were not operational after the jump. All AR-15's were functional.

b. Field maintenance on this weapon (AR-15) proved to be much simpler than on the other weapons.

c. While no decisive engagement was made so that the striking power of this weapon (AR-15) could be observed, the troops had great confidence in it and it is my belief that it would have greatly increased our overall firepower had it been tested." (Airborne Brigade)

(5.) (C) "During the period from 16 April to 11 May 1962, the 8th Battalion, Airborne Brigade, participated in two (2) operations of five (5) and four (4) days duration.

The AR-15 was carried during both operations. I was not in a position to observe the engagement of Viet Cong with the AR-15 during either operation although it was fired on different occasions.

The following remarks therefore, are confined to other observations and personal opinions on the AR-15:

a. Maintenance requirements for the AR-15 were negligible. I inspected numerous weapons throughout the entire period stated above and always found the weapons in excellent firing condition.

b. A great simplification in the small arms weapons could be effected by the adoption of the AR-15 to replace the BAR, M1, and Carbine. The effectiveness of the weapon (AR-15), however, I cannot attest to at this time.

c. The troopers have a great amount of respect for the AR-15. If the weapon were adopted as TO&E for Airborne Units, there would be a tremendous psychological uplift in the individual soldier's belief in his ability to shoot and kill." (Airborne Brigade)

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(6.) (C) "One company (96 off & EM) completely equipped with the AR-15. Six operations took place prior to any real use of the weapon.

Five VC were hit, all five with body wounds, and all five killed. Four were probably killing wounds with any weapon listed, but the fifth was essentially a flesh wound. The AR-15 made it a fatal wound.

The troops have a great deal of respect for the weapon and prefer it to all others. They take excellent care of it.

One left upper handguard was cracked and broke during routing a stubborn captive from a wooded area. The soldier concerned placed the handguard against a VC head with considerable force." (7th Infantry Division)

(7.) (C) "On 23-24 May 1962, one company completely equipped with AR-15's (87) plus Bn Hq elements was involved in one light and one heavy action. No wounded were captured and all casualties were inflicted with the AR-15. 27 Viet Cong were killed (24 counted by the advisor) and 25 captured. Grenades were used for the first time and were very effectively employed at ranges of 100-500 meters. They served as the real artillery support as we could not get the artillery to fire any closer than 400 meters. About 36 grenades were utilized in the heavy action, all propelled from the AR-15. The troops are very enthusiastic about the weapon and treat it with greater care than usual." (7th Infantry Division)

(8.) (C) "To date, this weapon has been used only for training. The simplicity of construction has reduced training time necessary for maintenance by approximately fifty per-cent. It is believed that this is an ideal weapon for this type weather and terrain." (Special Battalions)

(9.) (C) "On 13 April, 62, a Special Forces team made a raid on a small village. In the raid, seven VC were killed. Two were killed by AR-15 fire. Range was 50 meters. One man was hit in the head; it looked like it exploded. A second man was hit in the chest; his back was one big hole." (VN Special Forces)

(10.) (C) "This weapon is ideal for this country primarily for these reasons:

- a. Durability & ease of maintenance.
- b. Good Accuracy.
- c. Rapid rate of fire.
- d. Light weight (size & shape make it easy for Vietnamese to handle).
- e. Excellent killing or stopping power." (Airborne Brigade)

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D. (C) Analysis: Based on the numerical ratings and the comments of US Advisors and VN Unit Commanders, the AR-15 is the most desirable weapon for use in Vietnam for the following reasons:

1. Ease of training.
2. Suitable physical characteristics.
3. It is easy to maintain.
4. It is more rugged and durable than present weapons.
5. It imposes the least logistical burden.
6. It is the best weapon for all-around tactical employment.
7. Its semi-automatic firing accuracy is comparable to that of the M1 Rifle, while its automatic firing accuracy is considered superior to that of the Browning Automatic Rifle.
8. Vietnamese troops, Commanders and US Advisors prefer it to any other weapon presently being used in Vietnam.

APPENDICES:

1. Weapons Questionnaire
2. For the RVNAF Unit Commander
3. Questionnaire for the Senior MACV Advisor

CONFIDENTIAL**WEAPONS QUESTIONNAIRE**

Based upon your experience and observation as the Commander or Advisor of a unit of the RVNAF, rate the weapons on the right side of this questionnaire in order of preference with respect to the characteristics and questions listed. Your answers should reflect your opinion as to the value of the weapons to the Vietnamese, not the US Forces.

Rating Key: 5 - first choice 2 - fourth choice
 4 - second choice 1 - last choice.
 3 - third choice

A. TRAINING

	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>
1. Which weapon is easier to train the troops to use?	_____	_____	_____	_____	_____
2. Which weapon is easier to train the troops in functioning?	_____	_____	_____	_____	_____
3. Which weapon is easier to train the troops to disassemble and assemble?	_____	_____	_____	_____	_____

B. PHYSICAL CHARACTERISTICS

	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>
1. Which weapon, because of its size and shape, is easiest for the soldier to aim and fire?	_____	_____	_____	_____	_____
2. Which weapon, because of size, shape and weight, is easier for the soldier to carry over open terrain?	_____	_____	_____	_____	_____
3. Which weapon, because of size, shape and weight, is easier for the soldier to carry in the jungle?	_____	_____	_____	_____	_____
4. Which weapon is easiest to hold on a target while firing several rounds?	_____	_____	_____	_____	_____

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	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>
C. <u>MAINTENANCE</u>					
1. Which weapon is simplest to disassemble and assemble?	_____	_____	_____	_____	_____
2. Which weapon is easiest for the troops to maintain in the field?	_____	_____	_____	_____	_____
D. <u>RUGGEDNESS & DURABILITY</u>	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>
1. Which weapon is most rugged?	_____	_____	_____	_____	_____
2. Which weapon had the fewest stoppages and malfunctions?	_____	_____	_____	_____	_____
3. Which weapon is the most reliable under all conditions?	_____	_____	_____	_____	_____
E. <u>LOGISTICS</u>	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>
1. Which weapon imposes the smallest logistical burden? (Consider weight, spare parts, ease of repair, etc.)	_____	_____	_____	_____	_____
F. <u>TACTICAL</u>	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>
1. Which weapon is easiest to employ?	_____	_____	_____	_____	_____
Why?					
2. Which weapon would you prefer in ambush/counter-ambush situations?	_____	_____	_____	_____	_____
Why?					
3. Which weapon would you prefer against mass attacks?	_____	_____	_____	_____	_____
Why?					

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	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>
4. Which weapon do you consider most versatile? (Consider all capabilities)	_____	_____	_____	_____	_____
G. <u>ACCURACY</u> (Rate 5, 4 & 3)	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>
1. Which weapon appears most accurate when fired semi-automatically?	_____	_____	_____	_____	_____
2. Which weapon appears most accurate when fired automatically?	_____	_____	_____	_____	_____
H. <u>GENERAL</u>	<u>AR-15</u>	<u>M1 Rifle</u>	<u>BAR</u>	<u>SMG</u>	<u>M1 Carbine</u>
1. Which weapons do the troops prefer?	_____	_____	_____	_____	_____
Why?					
2. Which weapon would you prefer for your personal use?	_____	_____	_____	_____	_____
Why?					
3. Which weapon do you think is most suited to the Vietnamese soldier under present tactical conditions?	_____	_____	_____	_____	_____
Why?					
4. At what range do you think most Viet Cong are engaged?	_____	_____	_____	_____	_____
5. Which weapon do you think is most effective at that range?	_____	_____	_____	_____	_____
6. If the TO&E of your unit only allowed a single weapon, which one would you choose?	_____	_____	_____	_____	_____
Why?					

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I. REMARKS: In the space below, please make any pertinent remarks you may have concerning the AR-15 Rifle, its effectiveness in South Vietnam, its assets or its shortcomings (Continue on back of page if necessary).

Unit _____

Date _____

Signature _____

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CONFIDENTIAL**FOR THE RVNAF UNIT COMMANDER****QUESTION NO. 1:**

How many weapons of each of the following types were carried into the combat engagement, how many rounds of ammunition per weapon were carried, and how many rounds fired?

	<u>No. Weapons</u>	<u>Ammo rds/weap.</u>	<u>Ammo rds. fired</u>
BAR	_____	_____	_____
M1	_____	_____	_____
SMG	_____	_____	_____
Carbine	_____	_____	_____
AR-15	_____	_____	_____

QUESTION NO. 2:

How many VC were killed? _____
wounded? _____

How many of the VC were KIA by the AR-15? _____

How many of the VC were wounded by the AR-15? _____

QUESTION NO. 3:

What percentage of the friendly fire was full automatic? _____

What percentage of the AR-15 fire was full automatic? _____

What percentage of the AR-15's had the safety device installed that allowed either full or semi-automatic fire? _____

QUESTION NO. 4:

What was the maximum range at which shots were fired at the VC? _____

What was the average range? _____

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QUESTION NO. 5:

Were aimed shots fired through light brush? _____

If so, about what percent of the total fire from all weapons (BAR, SMG, M1, Cargine, AR-15) were aimed shots through light brush?

Less than 5% _____

Less than 20% _____

Less than 50% _____

More than 50% _____

In your opinion were shots from the AR-15 missed because of brush deflection? _____

If your answer to this question is yes, is it your opinion that the full automatic feature of the AR-15 and the extra rounds that can be carried for a given weight allowance do or do not compensate for this brush deflection? Yes _____ No _____ No Opinion _____

QUESTION NO. 6:

Were any rifle barrels bent in air drops or other rough handling and hard usage? _____

Were any barrels damaged by being fired with water in the bore? _____

Were there any malfunctions of any type? _____

If yes, please elaborate in the remarks section of this questionnaire.

QUESTION NO. 7:

As a unit commander of the RVNAF, how would you rate the AR-15 Rifle in the guerrilla warfare action you expect to fight as compared with the other types of weapons listed?

In each space use: A - For the AR-15 is better than
B - For there is no difference
C - For the AR-15 is worse than
D - For no opinion

	<u>M1</u>	<u>BAR</u>	<u>SMG</u>	<u>Carbine</u>
Speed of employment	_____	_____	_____	_____
Accuracy	_____	_____	_____	_____

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	<u>M1</u>	<u>BAR</u>	<u>SMG</u>	<u>Carbine</u>
Striking power	_____	_____	_____	_____
Fire power	_____	_____	_____	_____
Reliability	_____	_____	_____	_____
Field maintenance	_____	_____	_____	_____
Weight	_____	_____	_____	_____
Size	_____	_____	_____	_____
Overall	_____	_____	_____	_____
Overall for ambushes only	_____	_____	_____	_____

QUESTION NO. 8:

If the VC tactics grow into large scale attacks and the "human sea" type tactic is used, how would you rate the AR-15 overall against these other weapons? (Same scale as above: A, B, C, D)

<u>M1</u>	<u>BAR</u>	<u>SMG</u>	<u>Carbine</u>
_____	_____	_____	_____

QUESTION NO. 9:

Would the soldier who carried the AR-15 into this engagement choose it again over the weapon he formerly carried?

	<u>% would choose AR-15</u>	<u>% would choose other</u>
Formerly carried the BAR	_____	_____
Formerly carried the M1	_____	_____
Formerly carried the SMG	_____	_____
Formerly carried the Carbine	_____	_____

QUESTION NO. 10:

As an RVNAF unit commander, if you had your choice of weapons consisting of all four of the following: BAR, M1, SMG, Carbine or the AR-15, which would be your choice?

OPTION A: BAR, M1, SMG, Carbine _____.

OPTION B: AR-15 _____.

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If your answer is option A, would you choose to completely replace any of the four weapons with the AR-15?

Would completely replace: BAR _____.

M1 _____.

SMG _____.

Carbine _____.

QUESTION NO. 11:

Please elaborate in the space below or using extra sheets on any point not adequately covered above.

CONFIDENTIAL**QUESTIONNAIRE FOR THE SENIOR MAAG ADVISOR**

1. In the engagement with the VC covered by this questionnaire, how many of each of the following weapons were carried by your unit?

BAR _____ SMG _____ M1 _____ Carbine _____ AR-15 _____

2. If the AR-15 had not been used, how many of each would have been carried?

BAR _____ SMG _____ M1 _____ Carbine _____

3. As a MAAG Advisor to the RVNAF you obtain insight into the combat situation in SVN not available to the CDTC or to other US Government officials. These questionnaires can only gain a little part of the whole individual weapons problem. Some of the questions asked of the RVNAF unit commander are, therefore, repeated here because they are considered of prime importance.

QUESTION: How do you as a MAAG Advisor rate the AR-15 Rifle in the SVN guerrilla war as compared to the following weapons?

	<u>BAR</u>	<u>M1</u>	<u>SMG</u>	<u>Carbine</u>
A. The AR-15 is better.	_____	_____	_____	_____
B. No difference.	_____	_____	_____	_____
C. The AR-15 is worse.	_____	_____	_____	_____
D. No opinion.	_____	_____	_____	_____

How would you rate the AR-15 against these weapons for ambushes only?

How would you rate the AR-15 in a "human sea" attack against these weapons?

As a MAAG Advisor to RVNAF, if you were to recommend the TO&E of the above weapons or the AR-15 only which would you recommend? _____.

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4. If you would not recommend completely replacing all four of the above weapons with the AR-15, would you recommend completely replacing any one of the four?

Would recommend completely replacing BAR _____.
Would recommend completely replacing M1 _____.
Would recommend completely replacing SMG _____.
Would not completely replace any of these weapons _____.

5. Remarks: In the space below or on additional sheets please elaborate on any points not adequately covered above.

(Signature)

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ANNEX "B"

DETAILS OF COMPARISON TEST BETWEEN THE AR-15 AND M2 CARBINE

I. (C) GENERAL.

Personnel from a Vietnamese company that had just completed advanced individual training were used as test subjects for most of this comparison. The unit of 180 men was divided into two groups of 90 men each. Group A received one M2 Carbine per man, while Group B received an AR-15 for each man. Each group was then given a course of instruction on their respective weapon. The instruction for each was identical in time and scope of material covered. Following this, both groups underwent an identical test program which consisted of: assembly and disassembly; known distance firing, both semi-automatic and automatic fire; unknown distance firing, semi-automatic and automatic fire; bayonet course; and, infiltration course. This phase lasted for one week (44 hours). At the end of the first week, the two groups traded weapons and the course of instruction and the tests were repeated.

II.(C) SUMMARY OF TESTS.

To arrive at a valid conclusion concerning the relative suitability of the AR-15 as opposed to the M2 Carbine for possible use by selected units of the Armed Forces of the Republic of Vietnam, a total of nine tests were conducted. They were:

1. Comparison of Physical Characteristics.
2. Comparative Ease of Disassembly and Assembly.
3. Marksmanship Ability - Known Distance (semi-automatic and automatic fire).
4. Marksmanship Ability - Unknown Distance (semi-automatic and automatic fire).
5. Comparative Ruggedness and Durability.
6. Adequacy of Safety Features.
7. Effects of Open Storage in a Tropical Environment.
8. Comparative Ability to Penetrate Dense Foliage.
9. Troop Preference Poll.

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III. (C) DETAILS OF TESTS.

Test No. 1. Comparison of Physical Characteristics.

Purpose: To compare the physical characteristics of the AR-15 Rifle and the M2 Carbine.

Method: Both weapons were weighted and measured and the resulting data recorded.

Results:

a. Weights (lbs.):	<u>AR-15</u>	<u>M2 Carbine</u>
Weapon (less sling, magazine and accessories)	6.24	5.98
Magazine (empty)	0.18*	0.25*
Magazine (loaded - 20 rds)	0.68	-
Magazine (loaded - 30 rds)	-	1.02
Bayonet	0.62	0.72
Bipod	0.50	(No Bipod)
Sling	<u>0.19</u>	<u>0.07</u>
Totals: w/20 rd mag loaded	8.23	
w/30 rd mag loaded		7.79

*Figure not included in totals.

Relative Battle Load (lbs.) - including accessories of sling, bayonet, bipod.

Weapon w/12 magazines (240 rds)	15.71
Weapon w/8 magazines (240 rds)	14.93

b. Dimensions (inches):	<u>AR-15</u>	<u>M2 Carbine</u>
Length of barrel	20.00	18.00
Overall length	37.50	35.58
Overall length w/bayonet	42.98	42.26

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Analysis: The AR-15 and the M2 Carbine are comparable in size and weight and both are compatible with the light weight and small stature of the VN soldier. An integral grenade launcher and telescope mount and an accessory bipod are included in the weapon weight of the AR-15. These are not standard items for the M2 Carbine.

Test No. 2. Comparative Ease of Disassembly and Assembly.

Purpose: To compare the ease of disassembly and assembly of the AR-15 Rifle and the M2 Carbine and the difficulties of training encountered therein.

Method:

a. Each group of test subjects received a two hour period of instruction in the disassembly and assembly of their respective weapons. After completing this instruction, test personnel selected random samples of 10 men and had them disassemble and reassemble their weapons. This procedure was repeated with each group until 100 men had been tested with each weapon. Times were recorded by Non-Commissioned Officers and the weapons were inspected for proper assembly by Test Committee Cadre.

b. For the purpose of this test, both weapons were disassembled only as far as was necessary for field cleaning, i.e., "field stripped".

Results:

	<u>AR-15</u>	<u>M2 Carbine</u>
a. Average time required for disassembly & assembly.	1 min. 17 sec.	3 min. 17 sec.
b. Could not reassemble (percent)	0%	19%
c. Reassembled improperly (percent)	4%	10%
d. Number of parts handled by soldier in field stripping	7	11

Analysis:

a. The AR-15 is simpler and requires less time to disassemble and assemble for normal field cleaning.

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b. The average Vietnamese soldier can be trained in the disassembly and assembly for field cleaning of the AR-15 in a shorter time than for the M2 Carbine. This is further emphasized by the fact that all test subjects had previously received 12 hours of instruction on the M1 Carbine while undergoing basic combat training.

Test No. 3. Marksmanship Ability, Known Distance.

Purpose: To compare the ability of ARVN soldiers to deliver accurate semi-automatic and automatic fire on targets at known ranges using the AR-15 and the M2 Carbine.

Method:

a. Each group of test subjects received 10 hours of preliminary marksmanship training on their respective weapon. Upon completion of formal instruction, zeroing of weapons and practice firing at 26, 100 and 200 meters, each group fired a qualification course for test purposes. Each test participant completed this qualification course with both the AR-15 and M2 Carbine.

b. In semi-automatic fire, the course fired for the test was the standard ARVN M1 rifle qualification course. The scores obtained by the test subject with both weapons in this firing were compared with each other and with previous scores fired by the test subjects in qualifying with the M1 Rifle while undergoing Basic and Advanced Individual Training.

c. In automatic fire, the test subjects engaged the standard ARVN silhouette target at ranges of 75, 100 and 200 meters. Each individual fired a total of 40 rounds from each range. Scores were computed on the basis of 5 points per target hit and an average of 50% hits was used as the basis for qualification.

d. Throughout all firing, stoppages or malfunctions due to mechanical failures were noted and recorded.

e. Throughout all firing, observations concerning the adequacy of safety features and the ARVN soldier's ability to understand them were recorded.

CONFIDENTIAL**Results:**

	<u>AR-15</u>	<u>M2 Carbine</u>	<u>M1 Rifle</u>
Semi-automatic:			
Percent qualified	26%	27%	15%
Automatic:			
Percent qualified	71%	7%	

Analysis:

a. The ability of the ARVN soldier to deliver accurate semi-automatic fire on targets of known range with the AR-15 and the M2 Carbine is comparable. Test participants, as a group, fired a higher percentage of qualifying scores with both the AR-15 and M2 Carbine than they had previously fired with the M1 Rifle.

b. The ARVN soldier's ability to deliver accurate automatic fire on targets of known range is far greater with the AR-15 rifle than with the M2 Carbine.

Test No. 4. Marksmanship Ability, Unknown Distance.

Purpose: To compare the ARVN soldier's ability to deliver accurate semi-automatic and automatic fire on targets of unknown range using the AR-15 Rifle and the M2 Carbine.

Method:

a. The standard ARVN Transition firing course was used for this test.

b. Semi-automatic fire. Each man received 40 rounds to engage 20 targets at varying ranges from 50 to 250 meters. For a first round hit, he was awarded 10 points. For a second round hit, he was awarded 5 points. Qualification score for the course was 100 points.

c. Automatic Fire. Each man received 80 rounds to engage 20 targets in short bursts. Targets were located at varying ranges from 50 to 250 meters. Scores were computed on the basis of 5 points per target hit. Qualification score for the course was 100 points.

d. Throughout all firing, stoppages or malfunctions due to mechanical failures were noted and recorded.

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e. Throughout all firing, observations concerning the adequacy of safety features and the ARVN soldier's ability to understand them were recorded.

Results:

	<u>AR-15</u>	<u>M2 Carbine</u>
Semi-automatic run:		
Percent qualified	23%	22%
Automatic run:		
Percent qualified	23%	15%

Analysis:

a. The ARVN soldier's ability to deliver accurate semi-automatic fire on targets of unknown range using the AR-15 and the M2 Carbine is comparable.

b. The ARVN soldier's ability to deliver accurate automatic fire on targets of unknown range is greater with the AR-15 than with the M2 Carbine.

Test No. 5. Comparative Ruggedness and Durability.

Purpose: To compare the ruggedness and durability of the AR-15 Rifle and the M2 Carbine.

Method:

a. Concurrent with all other testing, observations concerning the ruggedness and durability of each weapon were recorded. During all firing exercises, any stoppage or malfunction of either weapon caused by mechanical failure was noted and recorded.

b. Fifty AR-15 Rifles and fifty M2 Carbines were each run through the standard ARVN Bayonet Assault Course twice. At the completion of the course, the weapons were inspected and "dry fired". Any deficiencies noted were recorded.

c. Fifty AR-15 Rifles and fifty M2 Carbines were each run through the standard ARVN Infiltration Course twice. At the completion of the course, the weapons were inspected and "dry fired". Any deficiencies noted were recorded.

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Results:

a. After the first week of firing, seven M2 Carbines were eliminated from the test. Six of these would not fire automatically because of defective disconnecter springs; the other would not fire at all because of a broken disconnecter pin. In contrast, all AR-15's functioned properly throughout the entire test period.

b. After negotiating the Bayonet Assault Course the second time, two M2 Carbines were eliminated from the test because of broken stocks. No AR-15 Rifles were damaged.

c. Both the M2 Carbine and the AR-15 were carried through the Infiltration Course twice without adverse effect.

Analysis:

a. The AR-15 is considered to be more rugged and durable than the M2 Carbine under conditions which require prolonged firing.

b. The AR-15 will stand up to rough handling normally encountered in combat situations better than the M2 Carbine.

Test No. 6. Comparison of the Adequacy of Safety Features.

Purpose: To compare the adequacy of the safety features of the AR-15 Rifle and the M2 Carbine with respect to their function and location and the ARVN soldier's ability to understand them.

Method:

a. Concurrent with all firing and tests in which ARVN soldiers handled the AR-15 and M2 Carbine, test committee cadre made observations concerning the adequacy of the safety features with respect to their function and location and the soldier's ability to understand them.

Results:

a. No misfires occurred throughout the firing that were attributable to improper functioning of the safety mechanism on either the AR-15 or the M2 Carbine.

b. The ARVN soldiers had no difficulty in understanding the function and operation of the safety mechanisms on either weapon.

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Analysis:

a. The safety features on the AR-15 and the M2 Carbine are considered comparable with regard to function and the ARVN soldier's ability to understand them.

b. The location of a single selector switch which combines the functions of safety selector and rate of fire selector, on the left side of the receiver where it is easily accessible to the thumb, enables the ARVN soldier to get the first round off faster with the AR-15 than he can with the M2 Carbine. With the M2 Carbine, he must manipulate the safety selector with his trigger finger, then return it to the trigger to fire. With the AR-15 he can keep his finger on the trigger while manipulating the safety selector with his thumb.

Test No. 7. Effects of Open Storage in a Tropical Environment.

Purpose: To determine the effects of open storage in a tropical climate on the AR-15 Rifle and the M2 Carbine and compare the results of such storage on each weapon.

Method:

a. Two AR-15 Rifles and two M2 Carbines were stored in the open for a period of two weeks without any care or maintenance. At the end of the storage, the weapons were examined and pertinent observations recorded.

Results:

a. M2 Carbines:

1. Because of rust and sand which had collected in the receivers, operating handles on both weapons could not be operated manually and force was required to open the bolts.
2. The operating slide stops would not function properly because sand and grit had fouled the operating slide stop springs.
3. Both magazines were rusty and had collected enough sand to prevent them from operating properly without first being thoroughly cleaned.
4. The chambers and bores of both weapons were rusty.

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5. The rear sights on both weapons could not be adjusted for windage due to the collection of rust and grit on the windage screws.

6. Approximately twenty minutes were required to clean each weapon before test personnel considered it safe to fire.

b. AR-15 Rifles:

1. The charging handles on both weapons were difficult to operate because sand had collected within the receiver.

2. The bolt and bolt carriers of both weapons were rusty.

3. The chambers and bores of both weapons were rusty.

4. Approximately five minutes were required to clean each weapon before test personnel considered them safe to fire.

Analysis: The AR-15 Rifle, because it has fewer moving parts, will function more readily than the M2 Carbine after extended periods of storage in the open under tropical conditions.

Test No. 8. Brush Penetration.

Purpose: To determine whether dense brush and undergrowth affects the trajectory of the AR-15 bullet and to compare its ability to penetrate heavy foliage with that of the M2 Carbine.

Method:

a. Silhouette targets were positioned behind dense underbrush which generally consisted of bamboo saplings, bush, grass and vines. From a distance of 15 meters, both the AR-15 Rifle and the M2 Carbine were fired at the targets.

b. The distance was then increased to 50 meters and the targets were fired upon again. (Beyond 50 meters it was impossible to distinguish a target, so this was considered an acceptable maximum distance for the test).

c. Procedures a and b above were repeated several times with foliage of varying density.

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<u>Results:</u>			<u>No. of hits</u>	
<u>Type of Underbrush</u>	<u>Range</u>	<u>No. of rounds fired</u>	<u>AR-15</u>	<u>M2</u>
Light underbrush	15 meters	6	6	6
Moderate underbrush & bamboo thicket	15 meters	6	6	6
Heavy underbrush & bamboo thicket interwoven with vines	15 meters	6	6	6
Light underbrush	50 meters	6	6	6
Moderate underbrush & bamboo thicket	50 meters	6	6	6
Heavy underbrush & bamboo thicket interwoven with vines	50 meters	6	6	5

Analysis:

a. The trajectory of the AR-15 bullet is not significantly affected when fired through dense underbrush at ranges up to 50 meters.

b. The AR-15 round will penetrate jungle undergrowth equally as well as the M2 Carbine round at ranges up to 50 meters.

Test No. 9. Troop Preference Poll.

Purpose: To obtain subjective data concerning the ARVN soldier's individual preference between the AR-15 Rifle and the M2 Carbine.

Method: Upon completion of all tests by participating personnel, each individual present for duty (158) was questioned with regard to preference between the two weapons.

Results:

a. Thought the AR-15 had the best "feel"	129	
Thought the M2 Carbine had the best "feel"		29

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b.	Thought the AR-15 had the best sight	66	55 92
	Thought the M2 Carbine had the best sight		
c.	Thought the AR-15 would stand up best under combat conditions	107	
	Thought the M2 Carbine would stand up best under combat conditions		51
d.	Preferred the AR-15 grip	129	
	Preferred M2 Carbine grip		29
e.	Thought AR-15 easier to load	120	
	Thought M2 Carbine easier to load		38
f.	Thought AR-15 easier to get ready to use	81	
	Thought M2 Carbine easier to get ready to use		77
g.	Thought AR-15 easier to disassemble	140	
	Thought M2 Carbine easier to disassemble		18
h.	Liked the AR-15 better from recoil standpoint	106	
	Liked M2 Carbine better from recoil standpoint		52
i.	Thought AR-15 easier to get back on target after firing a round	117	
	Thought M2 Carbine easier to get back on target after firing a round		41
j.	Thought AR-15 more dependable	107	
	Thought M2 Carbine more dependable		51
k.	Thought AR-15 best all around weapon for Infantry use	100	
	Thought M2 Carbine best all around weapon for Infantry use		58
l.	Thought AR-15 climbed least when fired automatically	117	
	Thought M2 Carbine climbed least when fired automatically		41

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m.	Thought AR-15 more accurate when fired full automatic	136	
	Thought M2 Carbine more accurate when fired full automatic		22
n.	Would prefer AR-15 in combat	130	
	Would prefer M2 Carbine in combat		28

Analysis:

a. The majority of test subjects preferred the AR-15 Rifle to the M2 Carbine in all aspects covered by the poll, except for the sights. Further questioning of the subjects by test committee personnel disclosed that this preference was due to greater familiarity with carbine-type sights, not because of an inability to understand the AR-15 sights. This is not considered a shortcoming of the weapon but a matter of training and familiarization.

CONFIDENTIAL**ANNEX "C"****SUGGESTED CORRECTIVE ACTIONS**

<u>DEFICIENCY/ SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
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SECTION I

This section contains deficiencies requiring elimination in order to make the item acceptable for use on a minimum basis.

None

None

None

SECTION II

This section lists those deficiencies and shortcomings in the item which were discovered during test and satisfactorily corrected prior to completion of the test. They no longer represent a defect in the item tested. The correction must be applied to the production model of this item.

None

None

None

SECTION III

This section contains shortcomings which are desired to be corrected as practicable, either concurrent with elimination of deficiencies in Section I, or in production engineering or by product improvement.

1. The upper hand guard is hard to grip when hands are sweaty.

Roughen surface.

Ltr. from OSD/ARPA on 11 Jul 62 states that manufacturer is now moulding "checking" on upper hand guards.

2. The weapon cleaning rod is of minimum length and hard to grip.

Add one (1) additional section and provide "T" shaped handle.

ANNEX "C"**CONFIDENTIAL**

CONFIDENTIAL

ANNEX "D"

PHOTOGRAPHS

This Annex contains miscellaneous photographs which visually depict pertinent aspects of the evaluation of the AR-15 conducted in South Vietnam.

PHOTOGRAPHS:

- 1. VN Soldier with AR-15 and M1 Rifle**
- 2. VN Soldier with AR-15 and BAR**
- 3. M2 Carbine and AR-15 Rifle with Accessories**
- 4. VN Soldier with AR-15 and M2 Carbine**
- 5. M2 Carbine and AR-15 Rifle**
- 6. M2 Carbine and AR-15 Rifle "Field Stripped"**
- 7. VC Casualty by AR-15 - 150 Meters**
- 8. VC Casualty By AR-15 - 15 Meters**

ANNEX "D"

CONFIDENTIAL



VN Soldier with AR-15.

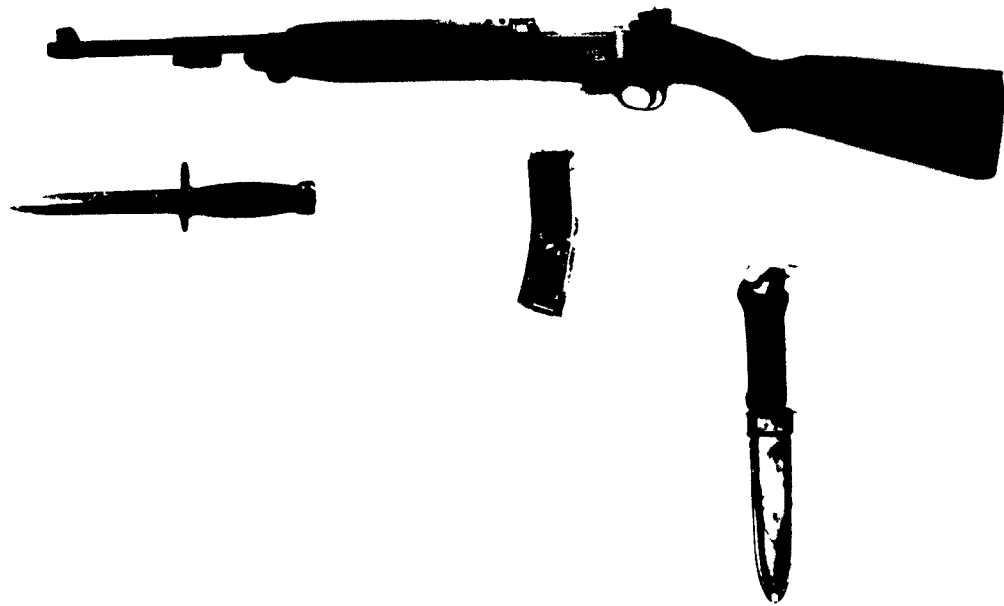


VN Soldier with M1 rifle.

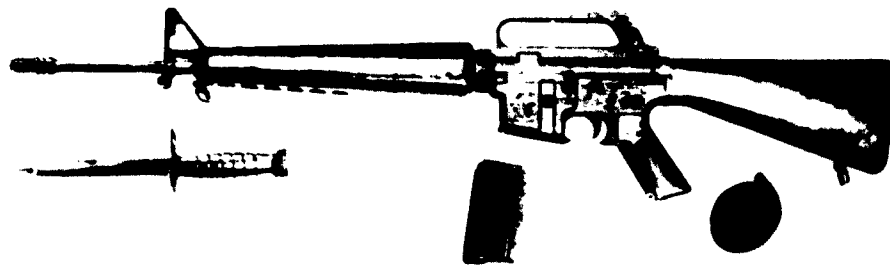


Figure 1. With Aiming Device





Marline, cal. .30, 12, w/standard accessories



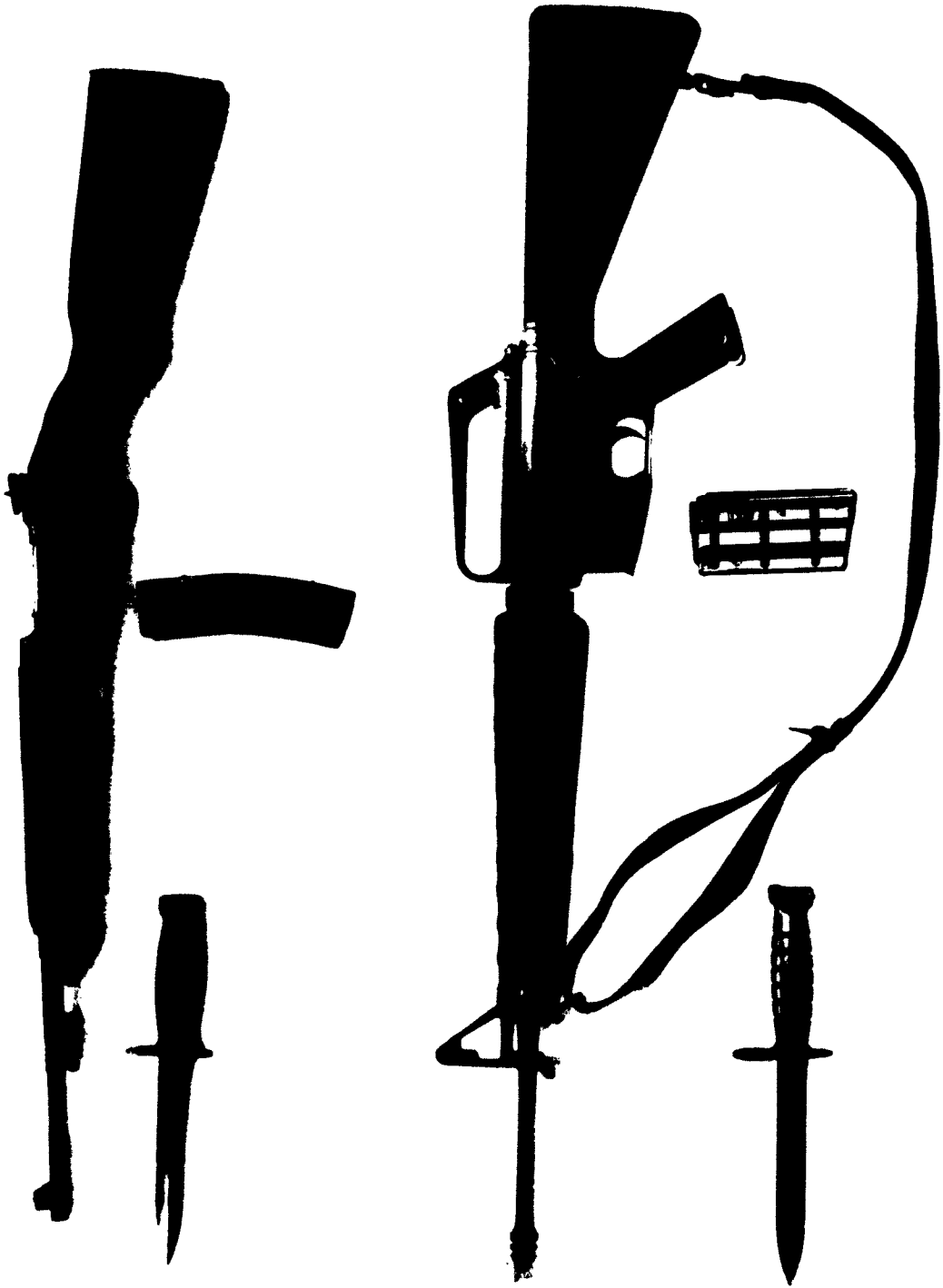
Rolt, ArmaLite Rifle, AR-15, cal. .22 w standard accessories.



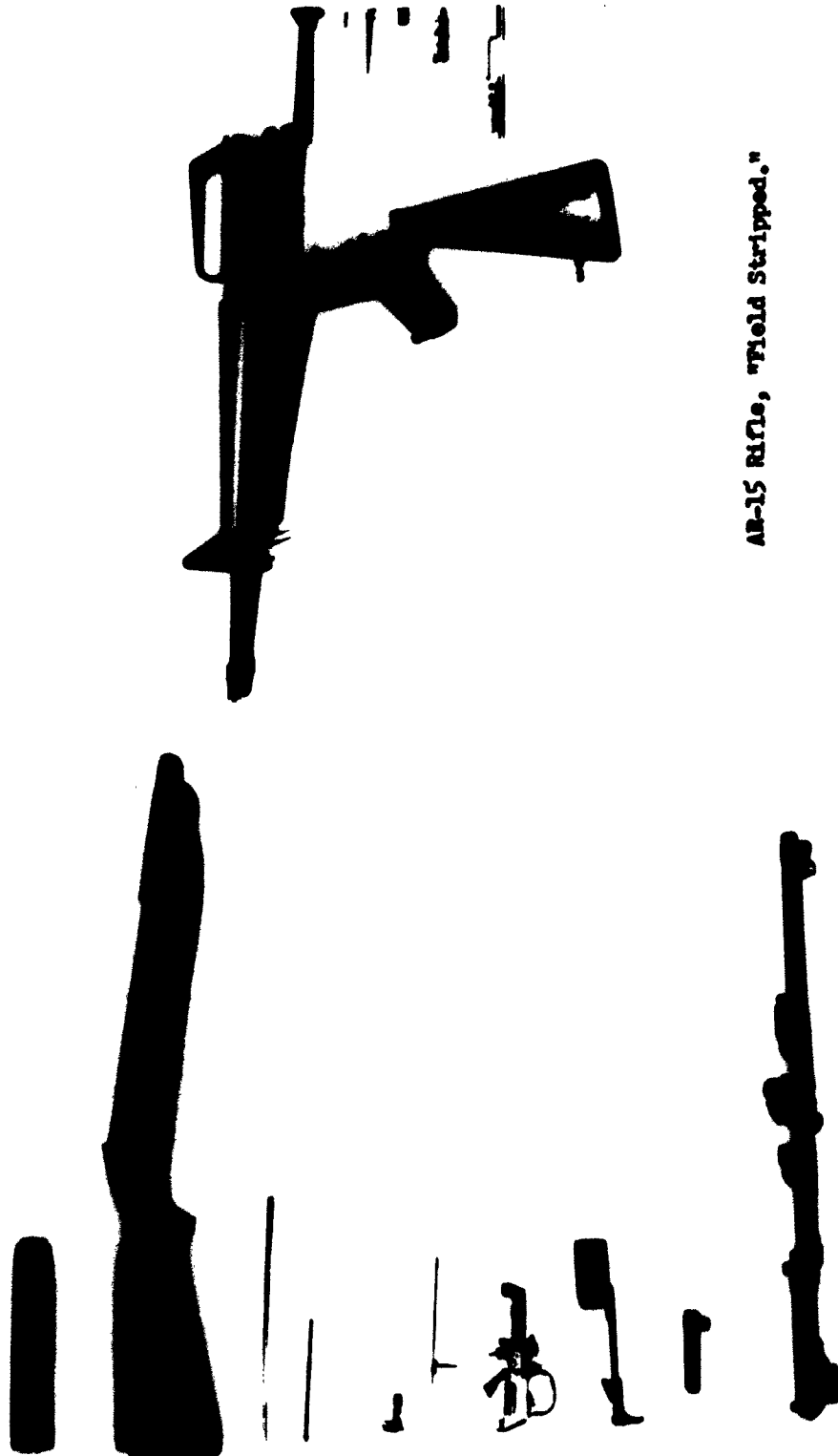
Assault Position with Carbine.



Assault Position with AR-15.



TOP: M2 CARBINE w/ BAYONET, 30 RD MAGAZINE
BOTTOM: AR-15 w/ 20 RD MAGAZINE



AR-15 Rifle, "Field Stripped."

M2 Carbine, "Field Stripped."

PHOTOGRAPH 6, ANNEX "D"

EXHIBIT 15

2021 National Firearms Survey: Updated Analysis Including Types of Firearms Owned

William English, PhD

Georgetown University

Expanded Report: May 13, 2022

Abstract

This report summarizes the findings of a national survey of firearms ownership and use conducted between February 17th and March 23rd, 2021 by the professional survey firm Centiment. This survey, which is part of a larger book project, aims to provide the most comprehensive assessment of firearms ownership and use patterns in America to date. This online survey was administered to a representative sample of approximately fifty-four thousand U.S. residents aged 18 and over, and it identified 16,708 gun owners who were, in turn, asked in-depth questions about their ownership and their use of firearms, including defensive uses of firearms.

Consistent with other recent survey research, the survey finds an overall rate of adult firearm ownership of 31.9%, suggesting that in excess of 81.4 million Americans aged 18 and over own firearms. The survey further finds that approximately a third of gun owners (31.1%) have used a firearm to defend themselves or their property, often on more than one occasion, and it estimates that guns are used defensively by firearms owners in approximately 1.67 million incidents per year. Handguns are the most common firearm employed for self-defense (used in 65.9% of defensive incidents), and in most defensive incidents (81.9%) no shot was fired. Approximately a quarter (25.2%) of defensive incidents occurred within the gun owner's home, and approximately half (53.9%) occurred outside their home, but on their property. About one out of ten (9.1%) defensive gun uses occurred in public, and about one out of thirty (3.2%) occurred at work.

A majority of gun owners (56.2%) indicate that they carry a handgun for self-defense in at least some circumstances, and about 35% of gun owners report carrying a handgun with some frequency. We estimate that approximately 20.7 million gun owners (26.3%) carry a handgun in public under a "concealed carry" regime; and 34.9% of gun owners report that there have been instances in which they had wanted to carry a handgun for self-defense, but local rules did not allow them to carry.

The average gun owner owns about 5 firearms, and handguns are the most common type of firearm owned. 48.0% of gun owners – about 39 million individuals – have

owned magazines that hold over 10 rounds (up to 542 million such magazines in total), and 30.2% of gun owners – about 24.6 million individuals – have owned an AR-15 or similarly styled rifle (up to 44 million such rifles in total). Demographically, gun owners are diverse. 42.2% are female and 57.8% are male. Approximately 25.4% of Blacks own firearms, 28.3% of Hispanics own firearms, 19.4% of Asians own firearms, and 34.3% of Whites own firearms. In total, Americans own over 415 million firearms, consisting of approximately 171 million handguns, 146 million rifles, and 98 million shotguns.

1 Introduction

This report summarizes the main findings of a national survey of firearms ownership and use conducted between February 17th and March 23rd, 2021 by the professional survey firm Centiment. This survey, which is part of a larger book project, aims to provide the most comprehensive assessment of firearms ownership and use patterns in America to date.

Before this survey, the most authoritative resource for estimating details of gun ownership in the U.S. has been the “Comprehensive National Survey on Firearms Ownership and Use” conducted by Cook and Ludwig in 1994 (Cook and Ludwig, 1996), and the most authoritative resource for estimating defensive gun use in the U.S. has been the “National Self-Defense Survey” conducted by Kleck and Gertz in 1993 (Kleck and Gertz, 1995, 1998). While valuable resources, they are both now a quarter century old, and no surveys of similar scope and depth have documented firearms ownership and use in more recent years.

Hepburn et al. (2007) conducted a more limited survey to ascertain the “gun stock” in 2004, a version of which was repeated in 2015 (Azrael et al., 2017). However, as they explain in introducing their latter survey, data sources on firearms ownership and use remain scarce:

Although the National Opinion Research Center’s General Social Survey and other surveys have asked respondents whether they personally own a firearm or live in a home with firearms, few have asked about the number of guns respondents own, let alone more detailed information about these firearms and the people who own them, such as reasons for firearm ownership, where firearms were acquired, how much firearms cost, whether they are carried in public, and how they are stored at home (Smith and Son 2015; Gallup 2016; Morin 2014). Because of this, the best and most widely cited estimates of the number of firearms

in civilian hands are derived from two national surveys dedicated to producing detailed, disaggregated, estimates of the U.S. gun stock, one conducted in 1994, the other in 2004 (Cook and Ludwig 1997, 1996; Hepburn et al. 2007).

Miller, Zhang, and Azrael conducted an expanded survey in 2021 of 5,932 gun owners with a focus on characterizing the demographics of those who acquired firearms for the first time during the COVID-19 Pandemic, based on a sub-sample of 447 individuals who fit this criterion (Miller et al., 2022). This team also described their survey as a “2021 National Firearms Survey,” and it is helpful to clarify that their survey was distinct from the survey reported here.

Richer survey data on firearms ownership and use has been collected by industry associations such as the National Shooting Sports Foundation (NSSF).¹ However, these surveys generally aim at assessing industry trends and market segmentation and are not necessarily designed to be nationally representative. In 2017, the Pew Research Center conducted one of the most recent and detailed surveys of the demographics of gun ownership (Brown, 2017).² Although it did not ask detailed questions concerning defensive use of firearms and the types of firearms owned, this recent Pew survey serves as a helpful benchmark for corroborating the general ownership estimates of the present survey.

Advances in survey research technologies make it possible to reach large, representative respondent populations today at a much lower cost than a quarter century ago. One of the limitations of the Cook and Ludwig survey, which sought to be nationally representative, was that the survey sample was relatively small, with about 2,500 respondents of whom only about 600, or (24.6%), owned a firearm when the survey was administered. As the investigators noted in their report, some sub-questions were not sufficiently well powered to make confident inferences, particularly concerning the defensive use of firearms. Similarly, Kleck and Gertz’s survey was limited to 4,977 respondents, and the more recent surveys by Pew, Hepburn, and Azrael are all based on less than 4,000 respondents.

¹See <https://www.nssf.org/research/>

²See Pew Research Center, June 2017, “America’s Complex Relationship With Guns” <https://www.pewresearch.org/social-trends/wp-content/uploads/sites/3/2017/06/Guns-Report-FOR-WEBSITE-PDF-6-21.pdf>

Today, professional survey firms like Centiment³ cultivate large pools of survey respondents, enabling representative sampling, and have techniques that encourage high response and completion rates while also ensuring the integrity of responses.⁴ The online survey summarized here was presented to a nationally representative sample (excluding residents of Vermont who had already responded to a pilot version of this survey) of 54,244 individuals aged 18 or over who completed an initial questionnaire that included an indirect question indicating whether they owned a firearm (respondents were presented with a list of items commonly owned for outdoor recreational purposes, including firearms, and were asked to select all items that they own).

This question identified 16,708 individuals as gun owners, who were then transferred to the main survey, which then asked detailed questions about their ownership and use of firearms. Given the length and detail of the survey, there was a slight amount of attrition, as 7.5%, or 1,258 individuals, did not make it through all questions to the end of the survey. However, 92.5% of the responding firearms owners (15,450) did proceed through all of the survey questions.

This survey thus contains what we believe is the largest sample of firearms owners ever queried about their firearms ownership and firearms use in a scientific survey in the United States. This survey was approved by Georgetown University's Institutional Review Board. Of note, this survey was conducted just after a period of widespread social unrest across the U.S. and a contentious presidential election, which background check data suggests led to record gun sales (approximately 39.7 million in 2020, up 40% from the prior year).⁵ It is thus a comprehensive and timely assessment of the state of firearms ownership and use in the United States. Finally, the extraordinarily large size of this sample enables us to make well-powered, statistically informative inferences within individual states, which considerably extends the value of this data.

The initial sample of respondents achieved excellent demographic representation across

³See <https://www.centiment.co/>

⁴See <https://help.centiment.co/how-we-safeguard-your-data>

⁵See McIntyre, Douglas A. "Guns in America: Nearly 40 million guns were purchased legally in 2020 and another 4.1 million bought in January" <https://www.usatoday.com/story/money/2021/02/10/this-is-how-many-guns-were-sold-in-all-50-states/43371461/>

all 49 states and DC, excluding Vermont (see Appendix A and B). For the purpose of estimating firearms ownership rates for the general U.S. population we employed raked weighting on gender, income, age, race, and state of residence. Note that there was a brief period in the first two days after the soft launch of the survey that comprehensive demographic data was not collected from those respondents who did not indicate firearms ownership, and thus did not proceed to the main survey (approximately 300 respondents). Although the survey company, Centiment, maintained demographic data on these panel respondents, it was determined that this data was not as comprehensive as the data collected by the survey, at which point the demographic questions were moved to the front of the survey, and asked of all respondents, including those who did not indicate firearms ownership. For the purpose of calculating statistics on national firearms ownership rates, we exclude the entire sample of both firearms owners and non-firearms owners from these first two days (410 respondents), leaving us with 53,834 respondents after this date for whom we have comprehensive demographic data. Firearms-owning respondents from the first two days are included in subsequent analysis of firearms owners, and we do possess comprehensive demographic information for these individuals.

Appendix B contains tables reporting the demographic sampling rates and the Census demographics used for raked weighting of the national survey. Note that the overall effect of weights is minimal given the high representativeness of the initial sample. For the purposes of analyzing responses within the sub-sample of firearms owners, we do not employ weighting schemes, in part because the “true” demographics of gun ownership are not knowable from an authoritative source analogous to the U.S. Census Bureau. However, as a robustness exercise, using weights based on estimates derived from the larger survey response rates yields results that are substantially identical for the analysis of responses from firearms owners.

One of the challenges in asking questions about firearms is eliciting truthful responses from firearms owners who may be hesitant to reveal information about practices that are associated with public controversy. The “tendency to respond to questions in a socially acceptable direction” when answering surveys is often referred to as “social desirability bias” (Spector, 2004), and there is evidence that it can influence survey responses to questions regarding firearms. For example, when Rafferty et al. (1995) conducted a telephone survey

of Michigan residents who had purchased a hunting license or registered a handgun, only 87.3 percent of the handgun registrants and 89.7 percent of hunting license holders reported having a gun in their household. Similarly, Ludwig et al. (1998) have documented a large gender gap in reporting of firearms ownership, finding that “in telephone surveys, the rate of household gun ownership reported by husbands exceeded wives’ reports by an average of 12 percentage points.” Asking questions via an anonymous survey instrument on the internet is likely to cause less concern or worry than traditional phone-based questionnaires with a live person on the other end or during face-to-face interviews, which is how the General Social Survey – one of the most prominent national surveys that regularly asks about firearm ownership – is conducted.⁶ Even when presented in the more impersonal setting of a computer interface, however, a survey must be worded thoughtfully so as to assure anonymity, and not give respondents reason to worry about answering truthfully.

This survey employs five common devices to encourage more truthful responses. First, it uses an indirect “teaser” question to pre-screen respondents in order to select those who own firearms. The initial question prompt presents the survey as concerned with “recreational opportunities and related public policies” and asks respondents if they own any of the following items, presented in a random order: Bicycle, Canoe or Kayak, Firearm, Rock Climbing Equipment, None of the Above. Only those who select “Firearm” are then presented the full survey. We also ask demographic questions at the outset, which allows us to assess the representativeness of the sample, including those who do not indicate firearms ownership. Second, the survey was carefully phrased so as to not suggest animus towards gun owners or ignorance of firearms-related terminology. Third, the survey assures respondents of anonymity. Fourth, in order to ensure that respondents are reading the survey questions carefully, and then responding with considered answers thereto, a “disqualifying” question (sometimes referred to as a “screening” question) was embedded a little over half of the way through the survey instructing respondents to select a particular answer for that question, which only those who read the question in its entirety would understand. Anyone registering an incorrect answer to this question was disqualified from the survey and their responses to

⁶For a description of the methods of the General Social Survey see: https://www.nsf.gov/pubs/2007/nsf0748/nsf0748_3.pdf

any of the survey questions were neither considered nor tallied.

Finally, while responses were required for basic demographic questions, if questions of a sensitive nature were left blank, the software would first call attention to the blank response and prompt the respondent to enter a response. However, if a respondent persisted in not responding and again tried to progress, rather than kick them out of the survey, they would be allowed to progress to the next section in the interest of obtaining the maximum amount of information that they were willing to share. Respondents were not made aware of this possibility in advance, and in practice such “opting out” of a particular question was seldom done (less than 1% of responses for the average question). This is the reason that small variations are sometimes observed in the total number of respondents for certain questions.

A pilot version of this survey was first fielded in Vermont as part of a research project aimed at documenting firearms ownership and firearms use rates in that specific state. The Vermont survey served as a proof of concept for the national version, demonstrating that this survey is a viable instrument for eliciting responses from firearms owners with both high response rates and low disqualification rates. The results of the Vermont survey are presented separately in Appendix A of this report and closely mirror national results.

This report focuses on providing descriptive statistics of answers to the major questions asked in the survey. Future research will examine responses, and relationships between them, in more detail. The report proceeds as follows: the next (second) section summarizes national firearms ownership estimates and demographics; the third section examines defensive uses of firearms; the fourth section examines question regarding carrying for self-defense; the fifth section summarizes ownership statistics, and the sixth section concludes.

2 Gun Ownership Demographics

- About a third of adults in the U.S. report owning a firearm, totaling about 81.4 million adult gun owners.
- 57.8% of gun owners are male, 42.2% are female.
- 25.4% of Blacks own firearms.

- 28.3% of Hispanics own firearms.
- 19.4% of Asians own firearms.
- 34.3% of Whites own firearms.

With raked weighting employed for gender, state, income, race, and age we find that 32.5% of US adults age 21 and over own a firearm (95% Confidence Interval, 32.1 - 32.9%). Expanding the sample population to include those age 18-20, who are restricted in some states from purchasing firearms, 31.9% of US adults age 18 and over own firearms (95% Confidence Interval, 31.5% - 32.3%). This is slightly above, but consistent with, the most recent in-depth survey of firearms ownership conducted by Pew in 2017 before the Covid-19 pandemic, which found that 30% of adults in America own a firearm (Brown, 2017). It is also consistent with recent Gallup polling in 2020 and 2021, which found that 32% and 31% of adults personally own a firearm (Gallup, 2021).

As a benchmark to assess the accuracy of the teaser question used to ascertain firearm ownership, we can also compare ownership rates of other items reported by respondents for this question. We find 52% of respondents indicating owning a bicycle, which closely matches Pew's finding that 53% of Americans own a bicycle, according to a poll conducted in 2014.⁷

The distribution of gun owners surveyed by state is illustrated in Figure 1, and ranges from 1,287 in California and 1,264 in Texas to 26 in Washington, DC and 24 in North Dakota.

Table 1 shows the proportion of the population in each state estimated to own a firearm. Massachusetts, Hawaii, Rhode Island, and New Jersey have the lowest rates of ownership with less than 20% of the adult population owning firearms, while Kentucky, Montana, West Virginia, and Idaho have the highest rates of ownership with more than 45% of the adult population owning firearms.

With regard to the demographics of gun ownership, we find that 57.8% of gun owners are male and 42.2% are female, the average age of gun owners is 46-50 years old, and the average annual household income is \$80,000-\$90,000. Approximately 18% of gun owners do not identify as White (alone). Overall, approximately 10.6% of gun owners identify as Black,

⁷See <https://www.pewresearch.org/fact-tank/2015/04/16/car-bike-or-motorcycle-depends-on-where-you-live/>

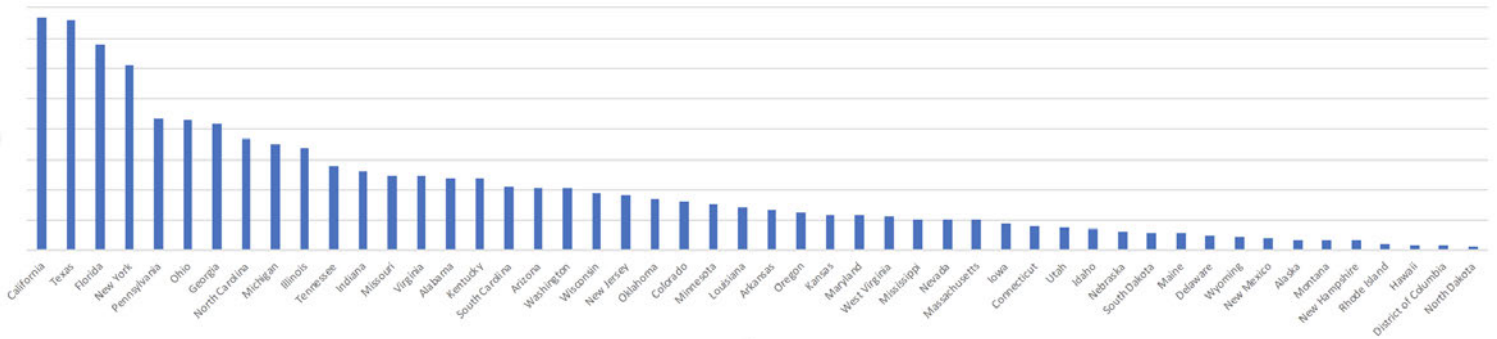


Figure 1: Distribution of Firearms Owners Surveyed

3.6% identify as Asian, 1.6% identify as American Indian, .2% identify as Pacific Islander, 82.0% identify as White, and 2.0% identify as Other. When analyzed within racial groups, we find that 25.4% of Blacks own firearms, 28.3% of Hispanics own firearms, 19.4% of Asians own firearms, and 34.3% of Whites own firearms.

According to the latest (2019) census estimates, there are approximately 255,200,373 individuals age 18 and over in the U.S., which implies that there are about 81.4 million adult gun owners.⁸ Note that this figure does not include those under the age of 18 who may use or possess firearms for purposes such as hunting or shooting sports.

In sum, firearms ownership is widespread, and firearms owners are diverse.

3 Defensive Use of Firearms

- 31.1% of gun owners, or approximately 25.3 million adult Americans, have used a gun in self-defense.
- In most cases (81.9%) the gun is not fired.
- Gun owners engage in approximately 1.67 million defensive uses of firearms per year.
- The majority of defensive gun uses take place outside of the home (74.8%).

⁸Census data is available at <https://www2.census.gov/programs-surveys/popest/tables/2010-2019/national/asrh/nc-est2019-syasexn.xlsx>

State	Proportion of adult population estimated to own firearms	95% Confidence Interval
Alabama	39.6%	35.2% – 44.1%
Alaska	33.4%	25.7% – 42.1%
Arizona	32.0%	28.8% – 35.4%
Arkansas	36.6%	31.1% – 42.5%
California	25.5%	24.0% – 27.0%
Colorado	33.6%	29.8% – 37.7%
Connecticut	20.2%	16.8% – 24.1%
Delaware	24.7%	18.9% – 31.6%
District of Columbia	23.9%	15.6% – 34.9%
Florida	30.3%	28.5% – 32.2%
Georgia	37.1%	34.5% – 39.9%
Hawaii	16.4%	10.6% – 24.5%
Idaho	54.5%	45.5% – 63.1%
Illinois	26.5%	24.3% – 28.9%
Indiana	40.3%	36.6% – 44.1%
Iowa	33.2%	28.1% – 38.8%
Kansas	42.8%	37.4% – 48.3%
Kentucky	46.7%	42.6% – 50.8%
Louisiana	32.8%	28.0% – 38.0%
Maine	35.9%	29.7% – 42.6%
Maryland	21.7%	18.5% – 25.2%
Massachusetts	15.8%	13.4% – 18.6%
Michigan	34.7%	32.0% – 37.5%
Minnesota	32.5%	28.4% – 36.8%
Mississippi	39.5%	33.5% – 45.8%
Missouri	39.7%	36.2% – 43.4%
Montana	48.4%	38.7% – 58.3%
Nebraska	37.2%	29.8% – 45.2%
Nevada	38.0%	32.8% – 43.4%
New Hampshire	24.1%	18.4% – 30.9%
New Jersey	19.3%	16.9% – 22.0%
New Mexico	33.8%	25.9% – 42.7%
New York	22.7%	21.3% – 24.2%
North Carolina	37.3%	34.5% – 40.2%
North Dakota	42.6%	29.9% – 56.4%
Ohio	33.7%	31.1% – 36.4%
Oklahoma	40.5%	36.2% – 45.0%
Oregon	38.3%	32.7% – 44.2%
Pennsylvania	30.3%	28.1% – 32.6%
Rhode Island	16.9%	11.4% – 24.2%
South Carolina	40.7%	36.5% – 45.1%
South Dakota	39.2%	32.4% – 46.4%
Tennessee	43.0%	39.5% – 46.6%
Texas	36.0%	34.1% – 38.0%
Utah	42.8%	36.1% – 49.8%
Virginia	30.6%	27.6% – 33.7%
Washington	32.8%	29.3% – 36.4%
West Virginia	53.0%	45.6% – 60.2%
Wisconsin	33.3%	29.9% – 36.9%
Wyoming	42.7%	34.5% – 51.2%

Table 1: Proportion of the population estimated to own a firearm in each state.

- About half of defensive gun uses involve more than one assailant (51.2%).
- Handguns are the firearm most commonly used in defensive incidents (65.9%), followed

by shotguns (21.0%) and rifles (13.1%).

Defensive use of firearms was assessed through a series of questions that asked for increasingly detailed information from those who indicated that they had used a firearm in self-defense.

First, all gun owners were asked, “Have you ever defended yourself or your property with a firearm, even if it was not fired or displayed? Please do not include military service, police work, or work as a security guard.” About a third (31.1%) answered in the affirmative, and they were then asked how many times they defended themselves with a firearm (from “once” to “five or more times”). As Figure 2 shows, a majority of gun owners who have used a firearm to defend themselves have done so on more than one occasion.

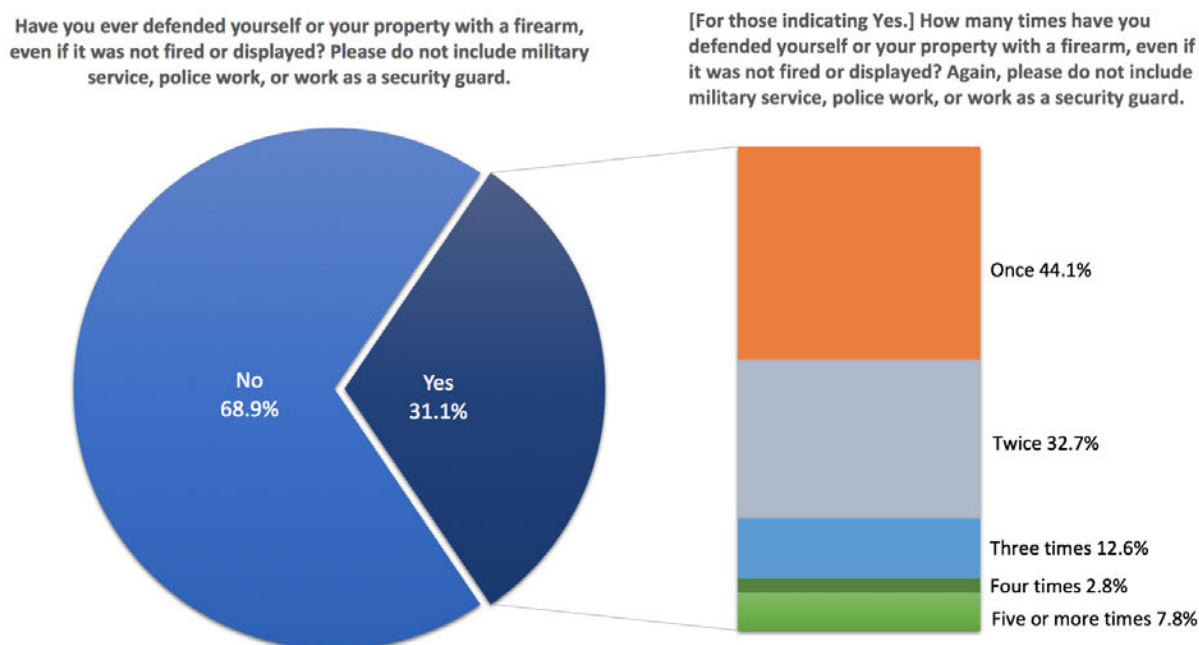


Figure 2: Defensive Gun Use: 31.1% of firearms owners have defended themselves or their property with a gun, and a majority have done so more than once.

Both men and women report having used firearms in self-defense at high rates, with 33.8% of male gun owners indicating they have defensively used a gun, and 27.3% of female gun owners indicating they have defensively used a gun. Table 2 further breaks down reports of

defensive use of firearms by categories of race and ethnic ancestry, illustrating that defensive gun use rates are higher in some minority groups.

Demographic Group	Proportion of Gun Owners Who Used Gun Defensively	95% Confidence Interval
White	29.7%	29.0% – 30.5%
Black	44.3%	41.2% – 47.5%
Asian	26.0%	21.7% – 30.9%
Native American	47.7%	42.7% – 52.7%
Pacific Islander	37.1%	26.0% – 49.7%
Other Ethnic Ancestry	36.2%	30.3% – 42.7%
Hispanic (any ancestry)	39.3%	36.0% – 42.8%
Male	33.8%	32.8% – 34.8%
Female	27.3%	26.2% – 28.4%

Table 2: Demographics of defensive gun use.

Given that 31.1% of firearms owners have used a firearm in self-defense, this implies that approximately 25.3 million adult Americans have defended themselves with a firearm. Answers to the frequency question suggest that these gun owners have been involved in a total of approximately 50 million defensive incidents. Assuming that defensive uses of firearms are distributed roughly equally across years, this suggests at least 1.67 million defensive uses of firearms per year in which firearms owners have defended themselves or their property through the discharge, display, or mention of a firearm (excluding military service, police work, or work as a security guard).⁹

⁹This is calculated by taking the total number of defensive incidents represented by the survey responses (50 million) and dividing by the number of adult years of the average respondent, which is 30. According to U.S. Census data, the average age of U.S. adults (i.e. the average age of those in the set of everyone 18 years or older) is 48, which also matches our survey data. Thus, the average respondent of the survey has 30 years of adult experience (48 years - 18 years = 30 adult years), over which the defensive incidents captured in this survey are reported.

Note that this estimate is inherently conservative for two reasons. First, it assumes that gun owners possessed firearms, or had access to firearms, from the age of 18. In so far as firearms were only first ac-

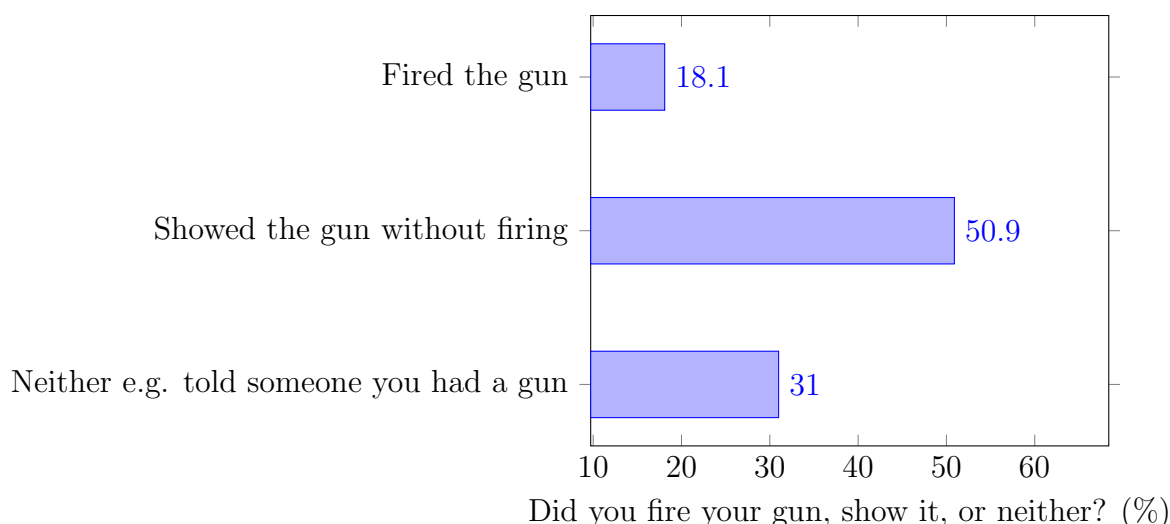


Figure 3: How Guns are Employed in Self-defense: In most defensive incidents no shots are fired.

Gun owner respondents were asked to answer detailed questions regarding each defensive incident. However, if a respondent reported a defensive gun use in a later year, this would reduce the number of adult firearms owning years represented by the survey responses and result in a higher estimate of the number of defensive incidents per year. Second, this figure only captures defensive gun uses by those currently indicating firearms ownership. According to Kleck and Gertz (1995), only 59.5% of respondents who reported a defensive gun use personally owned a gun (p.187). This would suggest that the true number of defensive gun uses, if those who do not personally own firearms are included in the estimate, could be substantially higher - perhaps as high as 2.8 million per year.

This approach is also robust to critiques that have been made by Hemenway (1996) and others who argue that defensive gun use estimates from surveys can be exaggerated due to recollection bias when respondents are asked to recount incidents within a limited time period. The intuition behind these critiques is that if respondents are asked, for example, if they used a gun defensively within the last year, there is a possibility that people will respond affirmatively if they used a gun in self-defense in recent memory, even if that incident wasn't strictly within the last 12 months. This could lead to inflated "per year" estimates of defensive gun uses, which would only be further magnified when extrapolated out to total defensive gun uses over many years. However, the approach of this survey is not vulnerable to this critique because the survey asks about defensive gun use at any time, not simply those within the last year or some other short time horizon. We thus do not engage in the exercise of extrapolating out estimates from potentially biased measures of comparatively rare events in a restricted window of time. Rather our approach asks questions about defensive gun use in the manner that is most methodologically sound for eliciting unbiased estimates.

Finally, note that our overall approach assumes that children are not employing firearms for self-defense

incident that they reported. As Figure 3 shows, in the vast majority of defensive gun uses (81.9%), the gun was not fired. Rather, displaying a firearm or threatening to use a firearm (through, for example, a verbal threat) was sufficient. This suggests that firearms have a powerful deterrent effect on crime, which, in most cases, does not depend on a gun actually being fired or an aggressor being injured.

Figure 4 shows where defensive gun uses occurred. Approximately a quarter (25.2%) of defensive incidents took place within the gun owner's home, and approximately half (53.9%) occurred outside their home but on their property. About one out of ten (9.1%) of defensive gun uses occurred in public, and about one out of thirty (3.2%) occurred at work.

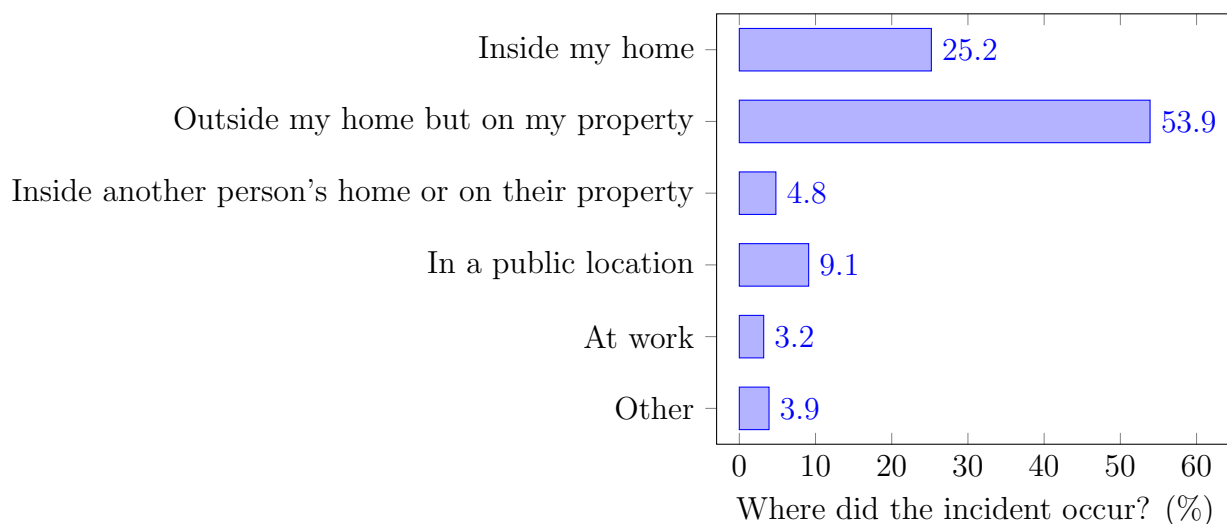


Figure 4: The Location of Defensive Incidents: Most take place outside the home.

For each incident, respondents were asked to indicate what sort of firearm was used. Figure 5 shows the distribution of types of firearms employed in defensive incidents. Handguns were the most commonly used firearm for self-defense, used in nearly two-thirds (65.9%) of defensive incidents, followed by shotguns (21.0%) and rifles (13.1%).

Respondents were also asked to indicate how many assailants were involved in each defensive incident. The vast majority of incidents involved only one assailant (91.1%). A small number of incidents involved two or more assailants (8.9%).

with any meaningful frequency. However, for the purpose of sensitivity analysis, if we lower the age used for calculating defensive incident frequency to assume that children as young as 12 years old are commonly possessing and using firearms for self-defense (and no non-firearms owning adults used firearms for self-defense), this would still imply 1.39 million defensive uses of firearms per year (48 years - 12 years = 36 years over which 50 million defensive incidents took place).

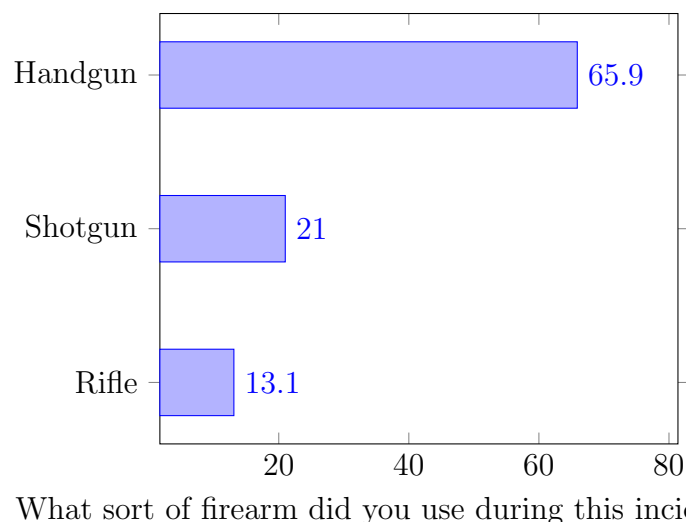


Figure 5: Type of Gun Used for Defense: Handguns are the most common type of firearm used in defensive encounters, followed by shotguns and rifles.

fensive incident. As Figure 6 illustrates, about half of defensive encounters (51.2%) involved more than one assailant. Presumably, part of the value of using a firearm in self-defense is that it serves as a force multiplier against more powerful or more numerous assailants. Survey responses confirm that encountering multiple assailants is not an infrequent occurrence in defensive incidents. 30.8% of defensive incidents involved two assailants, and 20.4% involved three or more, while slightly less than half (48.8%) involved a single assailant.

Finally, after respondents answered these detailed questions about each defensive incident, which all flowed from their initial affirmative answer to the question, “Have you ever defended yourself or your property with a firearm, even if it was not fired or displayed?”, all gun owners were asked, “Separate from any incident in which you directly used a gun to defend yourself, has the presence of a gun ever deterred any criminal conduct against you, your family, or your property?” This question was meant to capture incidents that did not involve active self-defense, but for which individuals believed that the presence of a firearm helped deter predatory behavior. For example, a situation in which a combative customer calmed down after noticing that shop owner had a handgun on his or her hip, or a situation in which a trespasser cooperatively left a property when questioned by a landowner who had a rifle slung over his or her shoulder, or a situation in which a friend showed up with a firearm

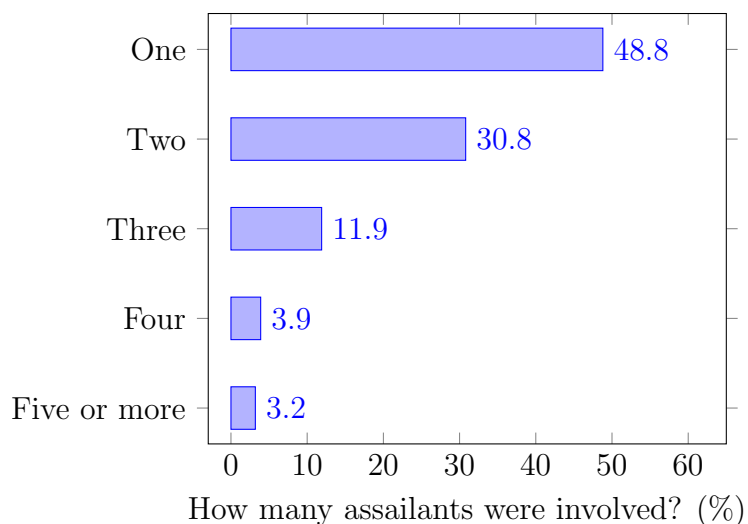


Figure 6: Distribution of the Number of Assailants Involved in a Defensive Incident: Multiple assailants are common.

to help diffuse a dangerous situation, could fall into this category. Respondents answering in the affirmative could indicate how many times such deterrence occurred, from once to five or more occasions. As Figure 7 illustrates, separate from the self-defense incidents summarized earlier, 31.8% of gun owners reported that the mere presence of a gun has deterred criminal conduct, and 40.2% of these individuals indicated that this has happened on more than one occasion. Extrapolated to the population at large, this suggests that approximately 25.9 million gun owners have been involved in an incident in which the presence of a firearm deterred crime on some 44.9 million occasions. This translates to a rate of approximately 1.5 million incidents per year for which the presence of a firearm deterred crime.

4 Carry Outside of the Home

- A majority of gun owners (56.2%) indicate that there are some circumstances for which they carry a handgun for self-defense.
- Approximately 26.3% of gun owners, or 20.7 million individuals, carry handguns for defensive purposes under a “concealed carry” regime.
- About a third of gun owners (34.9%) have wanted to carry a handgun for self-defense

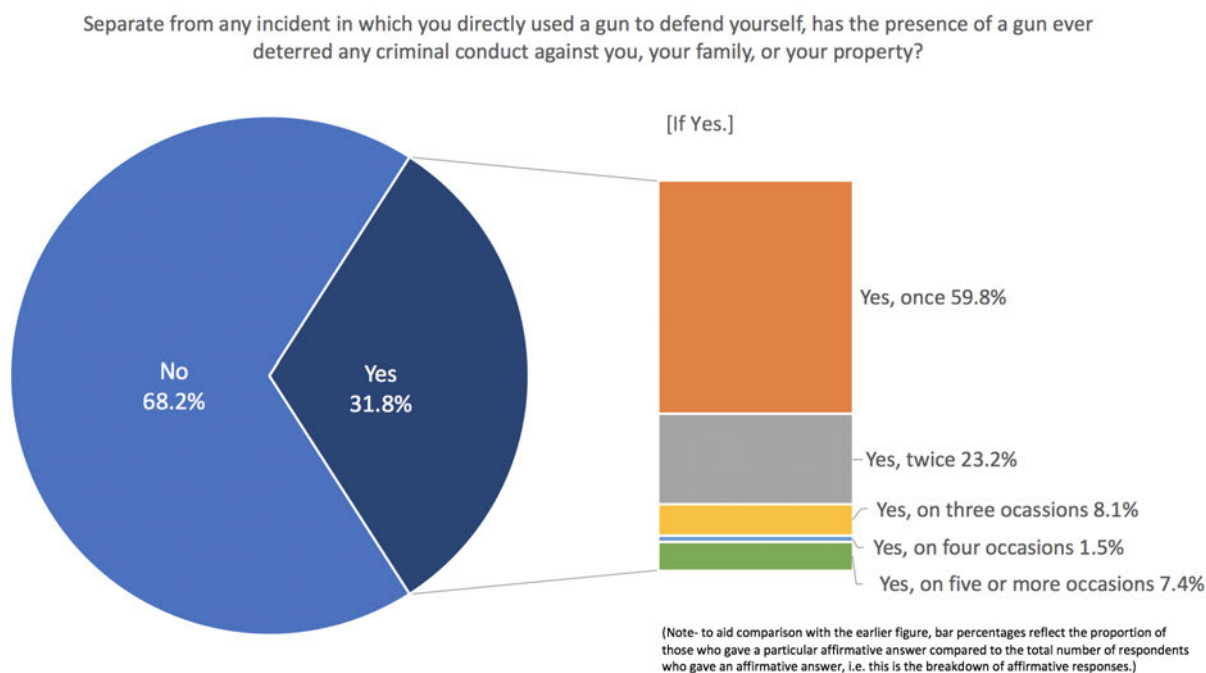


Figure 7: Frequency with which Firearms Deter Crime: 31.8% of firearms owners report that the presence of a firearm has deterred criminal conduct against them, often on more than one occasion.

in a particular situation but local rules prohibited them from doing so.

As Figure 8 illustrates, a majority of gun owners (56.2%), or about 45.8 million, indicate that there are some circumstances in which they carry a handgun for self-defense (which can include situations in which no permit is required to carry, such as on their own property); and about 35% of gun owners report carrying a handgun with some frequency (indicating that they carry “Sometimes,” “Often,” or “Always or almost always.”). Moreover, as Figure 9 summarizes, 34.9% of gun owners report that there have been instances in which they wanted to carry a handgun for self-defense, but local rules did not allow them to carry.

Assessing the number of people who carry a concealed handgun in public is complicated due, in part, to the proliferation of so-called “constitutional carry” or “permitless carry” states in recent years. These states - about 18 at the time this survey was conducted - generally allow adults in good legal standing (often restricted to those age 21 and older) to

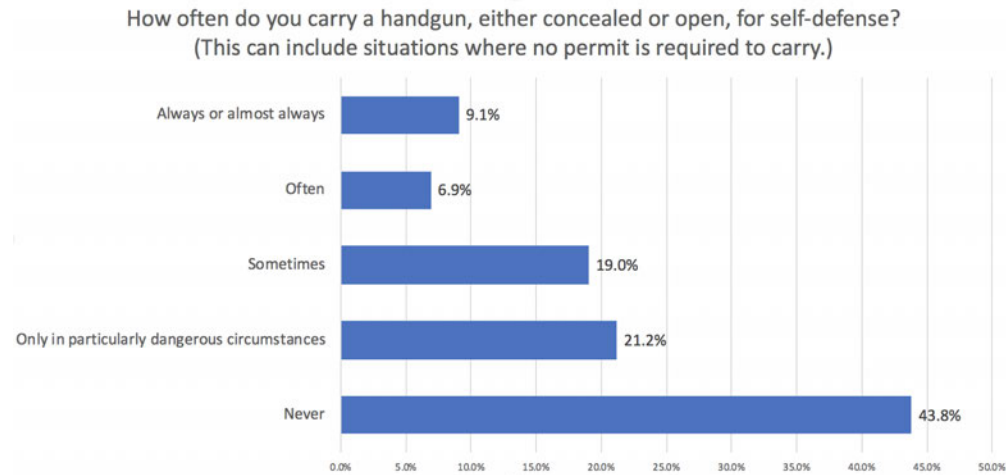


Figure 8: Frequency of Defensive Carry: Carrying a handgun for self-defense is common.

Have you ever wanted to carry a handgun for self-defense
but local rules did not allow you to carry?

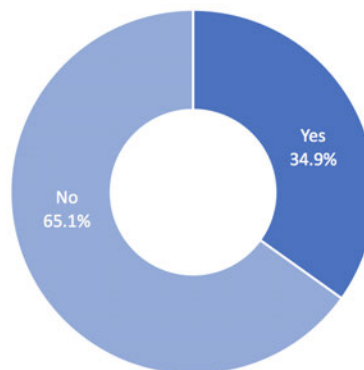


Figure 9: Prohibition of Carry: About a third of gun owners have wanted to carry a handgun for self-defense in a particular situation but local rules prohibited them from doing so.

carry a concealed weapon without a permit. Most of these states previously had a permitting process for concealed carry and required permits to be renewed at regular intervals in order to remain valid. Under constitutional carry, law abiding adults in these states are permitted to carry concealed without an official “permit.” However, most of these states continue to issue permits to residents who desire them because such permits can be useful for reciprocal carry benefits in other states. For example, a person acquiring a Utah carry permit would be entitled to carry a handgun in a number of other states such as neighboring Colorado and

Nevada.¹⁰ Thus, while basically all gun owners age 21 and over are “permitted” to carry a handgun for self-defense in constitutional carry states, many individuals may also possess a “permit,” even though it is redundant for in-state carry.

Unsurprisingly, when asked “Do you have a concealed carry permit?” gun owning residents of many constitutional carry states respond in the affirmative at high rates. Also complicating this question about concealed carry permits is the fact that many states refer to such permits by different names, the fact that the right to carry a handgun can be conferred in certain circumstances by hunting or fishing licenses in some states,¹¹ and the existence of other related permits, some of which do not license concealed carry (e.g. standard pistol permits in North Carolina or New York, eligibility certificates in Connecticut) and some of which do (most License To Carry permits required for handgun ownership in Massachusetts, state pistol permits in Connecticut, and LEOSA permits available to current and retired law enforcement officers nationwide). Finally, it is also possible for individuals to obtain concealed carry permits in states other than the one in which they reside.

In order to provide a robust but conservative estimate of those who actually carry in public, we code as “public carriers” those individuals who indicated both that they have a concealed carry permit and that they carry a handgun for self-defense at least “sometimes.” We also restrict analysis and population estimates to those age 21 and over given that most states restrict those under 21 from carrying concealed in public.

Using this simple definition, we find that 26.3% of gun owners are “public carriers,” which translates to approximately 20.7 million individuals who carry handguns in public under a concealed carry regime. Note that this could include current and former law enforcement officers who may be represented in the survey. However, the number of active law enforcement officers in the U.S. is well under a million (approximately 700,000 in 2019).¹²

¹⁰See <https://bci.utah.gov/concealed-firearm/reciprocity-with-other-states/>

¹¹For example, a number of states such as California, Georgia, and Oregon allow those with a hunting or fishing license to carry concealed while engaged in hunting or fishing or while going to or returning from an expedition. See: <https://oag.ca.gov/sites/all/files/agweb/pdfs/firearms/pdf/cfl2016.pdf>, <https://law.justia.com/codes/georgia/2010/title-16/chapter-11/article-4/part-3/16-11-126/>, <https://codes.findlaw.com/or/title-16-crimes-and-punishments/or-rev-st-sect-166-260.html>

¹²See <https://ucr.fbi.gov/crime-in-the-u.s/2019/crime-in-the-u.s.-2019/tables/table-74>

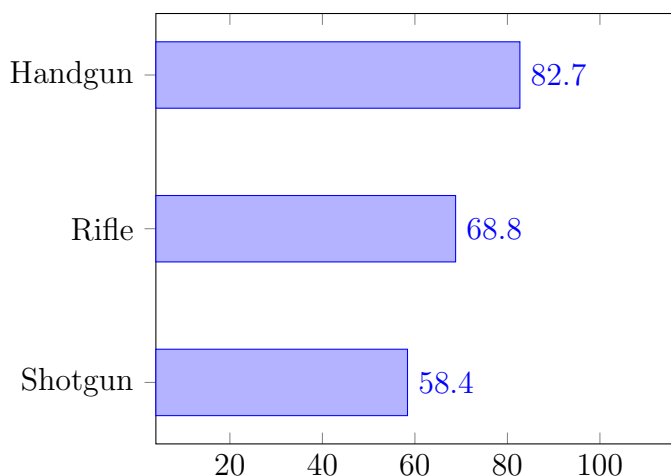
5 Types of Firearms and Magazines Owned

- 82.7% of gun owners report owning a handgun, 68.8% report owning a rifle, and 58.4% report owning a shotgun.
- The average gun owner owns about 5 firearms. The median gun owner owns 3.
- 29.0% of gun owners own only one firearm.
- 30.2% of gun owners, about 24.6 million people, have owned an AR-15 or similarly styled rifle, and up to 44 million such rifles have been owned.
- 48.0% of gun owners, about 39 million people, have owned magazines that hold over 10 rounds, and up to 542 million such magazines have been owned.
- Overall, Americans own in excess of 415 million firearms, consisting of approximately 171 million handguns, 146 million rifles, and 98 million shotguns.

5.1 Rifles, Shotguns, and Handguns

Respondents were asked to indicate the number of rifles, shotguns, and handguns that they owned. 82.7% of gun owners report owning a handgun (95% CI 82.0% - 83.3%), 68.8% reported owning a rifle (95% CI 68.1% - 69.6%), and 58.4% report owning a shotgun (95% CI 57.6% - 59.2%). Note that using survey weights based on in-survey demographics of firearms ownership has no substantive effect on these estimates: Handgun, 83.7% (82.9% - 84.4%), Rifle, 68.6% (67.7% - 69.6%), Shotgun 58.6% (57.6% - 59.6%).

Approximately 99.8% of respondents indicated owning fewer than 100 firearms of each type, and approximately 97.2% indicated owning fewer than 10 firearms of each type. In order to provide a conservative estimate of ownership rates and to ensure that average estimates are not skewed by a small number of large outliers, we exclude the 0.2% of responses that indicated owning over 100 firearms in any category in the analysis that examines average numbers of guns owned. Also, 1.5% of respondents entered zero for each category of firearms ownership. While ostensibly inconsistent with having earlier indicated ownership of a firearm, there are a number of plausible explanations for this discrepancy including a reluctance to



Percentage of gun owners reporting ownership of at least one firearm in the indicated category.

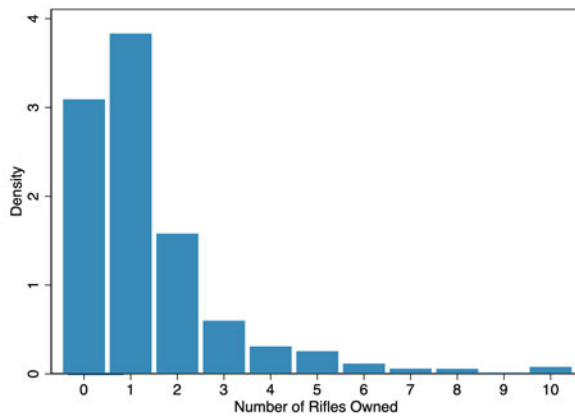
Figure 10: Percent of gun owners who own each type of firearm.

provide this level of detailed information, having use of a firearm in one's household which one does not personally own, or owning a firearm that technically does not fall into one of these three categories. We exclude these response in analyzing ownership rates below. However, including them has no significant effect on estimates.

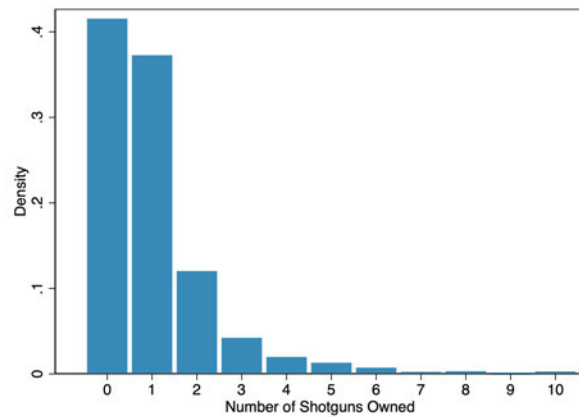
On average, gun owners owned 5.1 firearms, consisting of 1.8 rifles, 1.2 shotguns, and 2.1 handguns. Figure 11 plots histograms of the number of firearms owned by respondents. Unsurprisingly, these are skewed right, indicating that most gun owners own a small number of guns, while a smaller portion of gun owners own a large number of guns. The median gun owner owned 3 firearms. 29.0% of firearms owners owned only one firearm.¹³ Among those who only own one firearm, handguns are the most commonly owned type of gun (64.7%), followed by rifles (22.5%) and shotguns (13.3%).

Overall, these estimates imply that Americans own over 415 million firearms, consisting of approximately 171 million handguns, 146 million rifles, and 98 million shotguns.

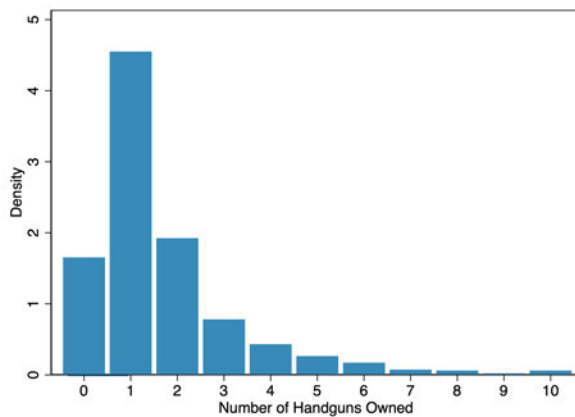
¹³An earlier draft had estimated that 21.9% of gun owners owned only one firearm, but the denominator for that calculation mistakenly included respondents who did not provide an answer to this question. The estimate of 29.0% properly incorporates all information provided by respondents.



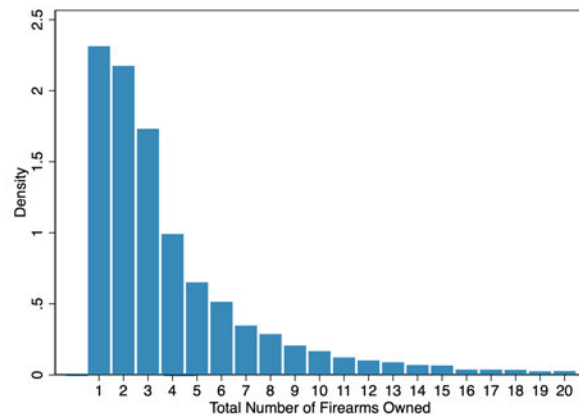
(a) Histogram of number of rifles owned



(b) Histogram of number of shotguns owned



(c) Histogram of number of handguns owned



(d) Histogram of total number of guns owned

Figure 11: Histograms showing the distributions of gun ownership.

5.2 Magazine Ownership

The survey asked respondents whether they have ever owned a magazine that holds more than 10 rounds. Those who answered in the affirmative were then asked to indicate the purposes for which they owned such magazines and to estimate how many magazines of different types they owned.

48.0% of gun owners (95% CI 47.2%-48.7%) responded yes to the question, “Have you ever owned a handgun or rifle magazine that holds more than 10 rounds? (You can count magazines that you may keep in another state if there are local restrictions against ownership.)” indicating that they had owned such magazines. Note that, again, using survey

weights based on in-survey demographics of firearms ownership has no substantive effect on this estimate (47.4%, CI 46.5%-48.4%). This suggests that approximately 39 million adults in the U.S. have owned magazines that hold more than 10 rounds.

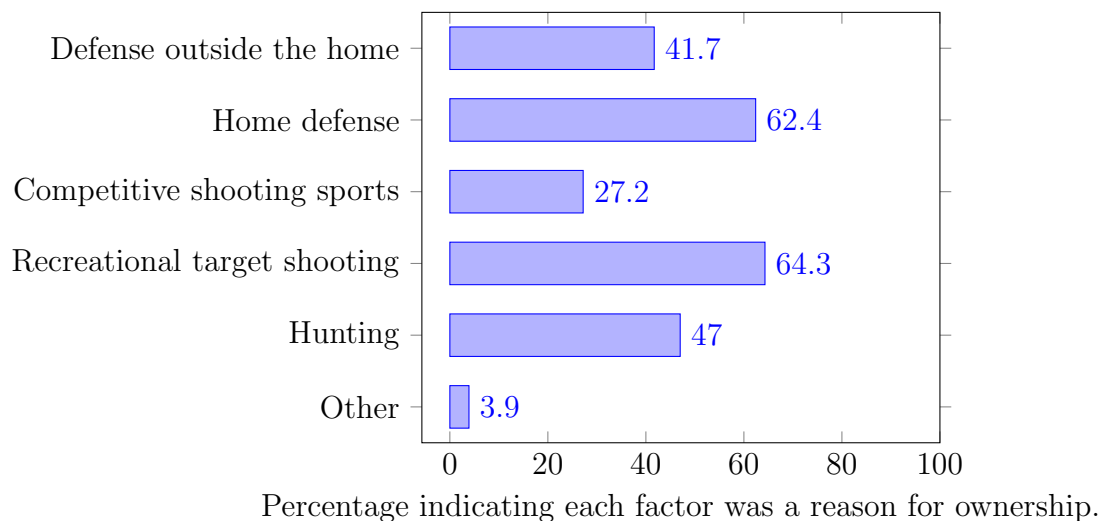


Figure 12: Purposes indicated for owning 11+ capacity magazines.

Figure 12 shows the percentage of respondents who indicated that they owned magazines that can hold more than 10 rounds for the following purposes: defense outside the home (41.7%), home defense (62.4%), competitive shooting sports (27.2%), recreational target shooting (64.3%), hunting (47.0%), and other (3.9%). Note that respondents could choose multiple purposes for which they owned such magazines. Home defense and recreational target shooting were the two most common reasons indicated for owning these magazines, with approximately two-thirds of respondents identifying each of these as a rationale for ownership.

Respondents who indicated that they had owned magazines that can hold more than 10 rounds were also asked to estimate the number of pistol and rifle magazines they owned of particular sizes. Numerical responses were unbounded. Approximately 99.8% of respondents indicated owning fewer than 100 magazines of each type, and approximately 96.5% indicated owning fewer than 10 magazines of each type. In order to provide a conservative estimate of ownership rates and to ensure that average estimates are not skewed by a small number of large outliers, we exclude the 0.2% of responses that indicated owning over 100 magazines

in a category.

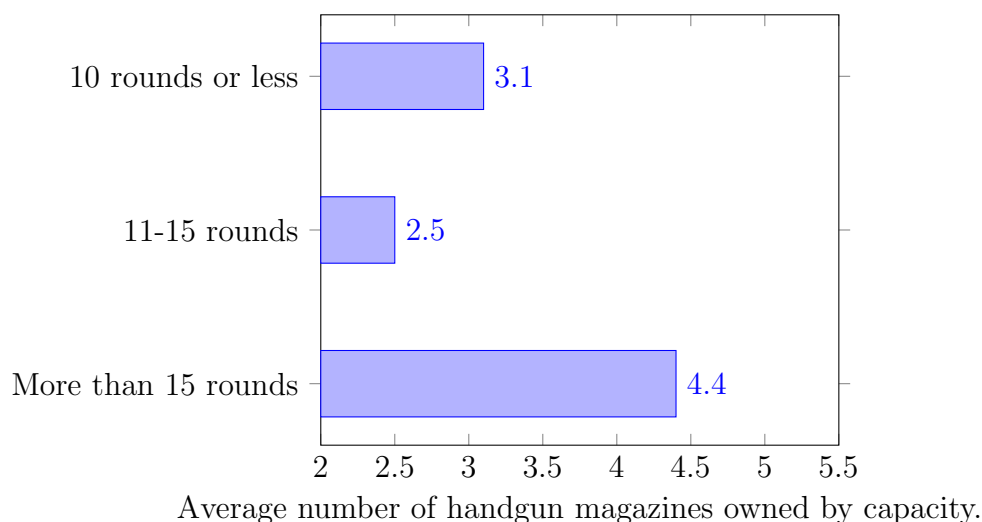


Figure 13: About how many handgun magazines of each type would you estimate you have owned?

Figure 13 shows the average number of handgun magazines of each type reported by respondents in this section: 10 rounds or less (3.1 magazines), 11-15 rounds (2.5 magazines), more than 15 rounds (4.4 magazines). In sum, the average respondent (who indicated that they have owned a magazine that holds more than 10 rounds), owns about 10 handgun magazines, and more than two-thirds of these magazines hold more than 10 rounds. Note that the question asked whether respondents have ever owned such magazines and how many such magazines they have owned, so these estimates should be interpreted as an upper bound on current ownership given that some magazines may have been resold. Building on earlier estimates, this suggests that U.S. gun owners have owned up to 269 million handgun magazines that hold over 10 rounds.

Figure 14 shows the average number of rifle magazines of each type reported by respondents in this section: 10 rounds or less (2.4 magazines), 11-15 rounds (1.8 magazines), over 15 rounds (5.4 magazines). In sum, the average respondent (who indicated that they have owned a magazine that holds more than 10 rounds), owns about 9.6 rifle magazines, and about three-quarters of these magazines hold more than 10 rounds. Building on earlier estimates, this suggests that U.S. gun owners have owned up to 273 million rifle magazines that

hold over 10 rounds.

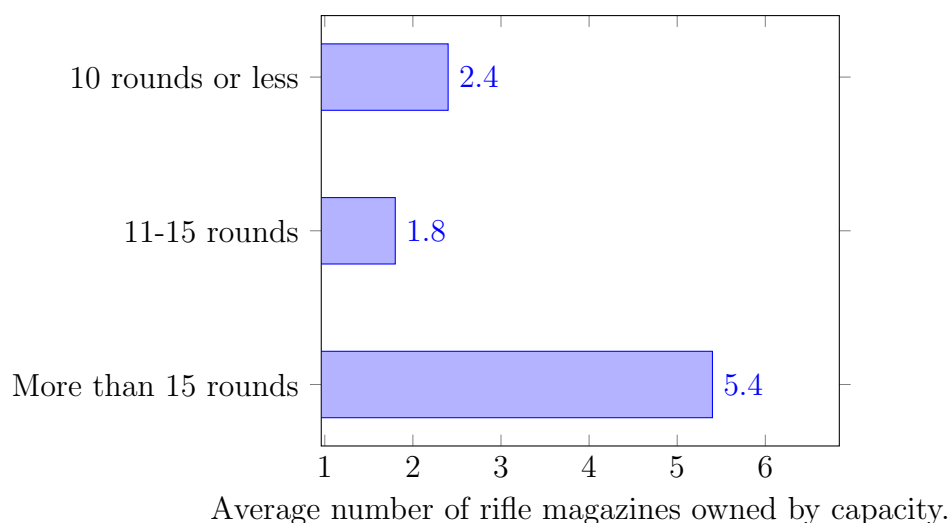


Figure 14: About how many rifle magazines of each type would you estimate you have owned?

These estimates suggest that Americans have owned some 542 million rifle and handgun magazines that hold over 10 rounds. Finally, note that these questions about the types of magazines owned were only asked of those who indicated that they had owned a magazine that holds more than 10 rounds, and thus we do not know how many magazines up to 10 rounds are owned by the 52.0% of gun owners who are not in this category.

Table 3 shows the breakdown of ownership of magazines that hold over 10 rounds across different demographic segments.

Table 4 shows the percentage of gun owners in each state who indicated that they have owned magazines that hold more than 10 rounds. Note that this question explicitly instructed respondents that “You can count magazines that you may keep in another state if there are local restrictions against ownership.” This presumably explains the relatively high rates of ownership in states that restrict the purchase or ownership of such magazines. It’s also possible that those answering in the affirmative possess magazines that were grandfathered in because they were acquired before such bans or that some respondents have gotten rid of magazines that they owned in the past.

Another dynamic that likely contributes to such differences in ownership rates derives

Demographic Group	Proportion	95% Confidence
	Owned 11+ Mags	Interval
White	47.0%	46.1% – 47.8%
Black	55.2%	52.2% – 58.2%
Asian	50.0%	44.8 – 55.2%
Native American	52.6%	47.7% – 57.4%
Pacific Islander	59.1%	47.4% – 69.9%
Other Ethnic Ancestry	59.6%	53.3% – 65.6%
Hispanic (any ancestry)	61.6%	58.3% – 64.7%
Male	57.7%	56.7% – 58.7%
Female	34.1%	33.0% – 35.3%

Table 3: Demographics of ownership of magazines that hold more than 10 rounds.

from the fact that in states with low rates of firearms ownership, such as DC and Hawaii, those few individuals who do own guns are presumably more likely to be gun enthusiasts. Indeed, analysis of the survey data reveals that states with higher rates of firearms ownership are associated with slightly lower rates of ownership of magazines that own over 10 rounds, and this difference is statistically significant (coef = -0.36, p=.03).

Given that such a large percentage of gun owners indicated that they owned magazines that hold over ten rounds for defensive purposes, we further analyze the potential value of these magazines for defense. Recall that a majority of defensive incidents involved multiple assailants (51.2%). Presumably, it would be advantageous to have a firearm with a larger capacity magazine if one needed to engage more than one assailant, which these responses suggest is indeed common. Although in most defensive gun uses the gun was not fired (81.9%), we can further analyze the subset of incidents in which a gun was fired. In 67.8% of these cases in which a gun was fired in self defense, multiple rounds were fired.

As part of the self-defense section of the survey, respondents were invited to answer an open response question that asked: “Have you ever been in a situation (including any referenced in earlier responses) in which it would have been useful for defensive purposes

State	Owned 11+ cap. mags	95% Confidence Interval
Alabama	48.1%	42.7% – 53.6%
Alaska	52.7%	39.6% – 65.4%
Arizona	47.5%	42.3% – 52.8%
Arkansas	50.7%	44.1% – 57.3%
California	53.8%	51.0% – 56.5%
Colorado	51.4%	45.3% – 57.4%
Connecticut	42.6%	34.4% – 51.3%
Delaware	50.6%	39.8% – 61.5%
District of Columbia	69.2%	49.5% – 83.8%
Florida	46.9%	43.9% – 49.8%
Georgia	52.4%	48.7% – 56.2%
Hawaii	59.3%	40.3% – 75.8%
Idaho	45.4%	36.7% – 54.4%
Illinois	51.5%	47.3% – 55.6%
Indiana	46.5%	41.8% – 51.2%
Iowa	35.4%	28.0% – 43.6%
Kansas	42.2%	35.4% – 49.4%
Kentucky	43.7%	38.5% – 49.0%
Louisiana	47.4%	41.1% – 53.8%
Maine	37.9%	28.7% – 48.0%
Maryland	50.8%	43.7% – 57.8%
Massachusetts	53.3%	45.7% – 60.8%
Michigan	37.1%	33.2% – 41.1%
Minnesota	39.8%	34.0% – 46.0%
Mississippi	44.6%	37.3% – 52.2%
Missouri	50.6%	45.8% – 55.5%
Montana	52.6%	39.8% – 65.1%
Nebraska	45.5%	35.9% – 55.3%
Nevada	61.0%	52.8% – 68.5%
New Hampshire	43.9%	31.6% – 56.9%
New Jersey	52.2%	46.5% – 57.8%
New Mexico	49.2%	36.9% – 61.5%
New York	54.9%	51.8% – 58.0%
North Carolina	43.9%	39.9% – 47.9%
North Dakota	44.4%	24.0% – 67.0%
Ohio	42.0%	38.4% – 45.7%
Oklahoma	47.5%	41.7% – 53.4%
Oregon	49.8%	42.9% – 56.6%
Pennsylvania	39.6%	36.0% – 43.2%
Rhode Island	55.3%	39.5% – 70.1%
South Carolina	42.8%	37.7% – 48.0%
South Dakota	50.0%	40.2% – 59.8%
Tennessee	44.1%	39.5% – 48.7%
Texas	54.1%	51.3% – 56.8%
Utah	46.8%	38.2% – 55.6%
Virginia	47.5%	42.7% – 52.4%
Washington	53.1%	47.8% – 58.4%
West Virginia	44.8%	37.7% – 52.1%
Wisconsin	33.6%	28.5% – 39.0%
Wyoming	63.0%	51.4% – 73.3%

Table 4: Percent of gun owners who have indicated that they have ever owned magazines that hold over 10 rounds by state. Note that this includes magazines that an owner holds in other states if there are local ownership restrictions.

to have a firearm with a magazine capacity in excess of 10 rounds? If so, please briefly describe that situation.” Approximately 550 respondents gave a affirmative response with most sketching out details of the encounter. Examples of these responses (reported verbatim) include:

- I got jumped by multiple people in a carjacking in front of our apartments with my wife and children.
- Yes. I was robbed on a street 1 time by a group of about 6 people that at least 1 was armed and I wasn't. It took about 6 hours of emergency surgery to get my bones in face jaws and skull back in place from being beaten in the head face kicked all over. Damn near killed me.
- Yes, a man broke into our apartment, high. He was approx 6'4, 300 pounds & threw a friend of ours around the living room like a rag doll. Beat her repeatedly.
- Yes. The first incident I mentioned. Three men attempted to rob me outside my home, with the intention of entering my home thereafter. My wife and child were inside the home at the time. That was in California with a magazine that only held 7 shots. I am a great shot, prior military and other firearms training, but I hate to only have 7 shots with three people. In such a situation, very well trained people, pumped up with adrenalin can and do miss their target. Thank you.
- Yes, absolutely. I am mobility challenged and was walking my dog one day. Three men ambushed me from behind, but luckily my dog chased them away. My dog actually bit one of the men.
- On the farm, we have had mountain lions killing our calves so a larger animal could require more rounds
- When two people attacked my company's warehouse
- Yes, I was alone with my son and 3 large men were trying to break in, I was unable to reload, thank goodness they realized and left.

- I was charged by a bear. It was very scary in the moment I panicked and rattled over multiple shots. Most missed but some hit home and eventually stopped him.
- Yes. I went in but into a store and 4 thugs approached me telling me to give them money. I produced my handgun at my side and they left. If this had been a shooting with multiple bad guys with guns a 15 round magazine is best.
- When I was a teenager 4 guys did a home invasion at our house. I could easily see needing a 20 to 30 round clip would be necessary.. we didnt have weapons and my mom and dad were hurt pretty bad. Dad was stabbed 4 times and they had a gun too. Thats when I decided when I was on my own that I would have protection.
- About 20 coyotes attacked some of my livestock. It took two 30 round magazines to repel the animals and then only after killing 10 of them.
- Yes. I was surrounded by would-be assailants in a perking lot. I was able to escape unharmed, but if they had rushed me, I would most certainly had to lay down a rapid field of fire, alternately in various directions. In that scenario, I probably would have missed the targets and needed multiple, rapid follow-up shots to hit or at least dissuade the attackers from pressing forward. Only a firearm with 10 or more round magazine would offer that kind of defensive capability.
- Had several people trespass on my property doing something illegal and when I called the police said it would be a while before they could come out so when I asked the people to leave they threatened to kill me but after they seen that I was open carry the left if the situation went a different way I dont know if I would have been about to protect myself with as many of them as there was
- The time when there were 4 people in my home and I was fearful of being hurt and my concern was do I have enough rounds to protect myself what if I missed if I had to fire the weapon .
- Yes. Been stalked by a pack of coyotes while hiking with my children

- Yes when I had more than one person trying to break into my car. I live out in the country so I do not have time to wait for police to get to me I have to act fast and protect myself and my family.
- Yes, I ran into a situation where there were numerous criminals breaking the law and rioting at a public venue during an annual festival event. They were blocking my self and my friends, two of which were females, from leaving the area as well as preventing the police from reaching us. I was very glad that I had multiple magazines that had more then a 10 round capacity.
- 2 men broke into my home while I was sleeping. I woke up and heard them breaking stuff downstairs. I grabbed my gun and ran down stairs and confronted them. I pointed my gun at them and told them to get out. They ran off.
- I was stopped at a red light. Car in front of me backed up and the car behind me pulled up to my bumper. Both drivers got out and approached both sides of my car. Light turned green. I gassed it pushing the car in front of me out of the way. They had bats to break my windows. Would've robbed me I think. Was under a overpass.
- Twice it was people attempting to break into my home I was alone age 64 and 4 burly men thought no one was home as I had been napping. They learned quickly this old lady was not without protection. They saw the gun and quickly left. I called 911 and they were appended they had been robbing homes for 6 weeks in the area. Those home who had guns they left and went elsewhere. Another time people a group wanted a big party came to the wrong road half were drunk or stoned. I had small children. There was finally someone sober enough to see I had a gun and that I meant business it was the middle of the night and they wanted to party but had the wrong road. The sane person got them to all leave and they never came back. We had no phone at that time. The third time was a cougar attacking my livestock. It ran off but had killed 4 goats. We called the game warden they had a special hunt and killed it as we had been the 4th place hit it had killed livestock. We have had cougar on our property in our yard 3 times since once my son shot one stalking him and his dog the other time

it ran off before he could get his gun ready.

- yes, but not at home, we were camping in prescott arizona and several men came up and wanted to harass and steal from our family. We all felt very threatened and if another couple of people had not shown up with their guns the people would have over ran us and my family would have been hurt.
- It could have helped during a robbery at my residence where 4 intruders entered my home
- I was a small business owner before I became disabled. I would often carry large amounts of cash. On more than 1 occasion I was faced with pulling my weapon or lose my cash
- I was walking a long distance through Philadelphia to get to a restaurant and was approached by 3 men who demanded to know why I thought I could go through their neighborhood. I told them I did not want any trouble and tried to continue walking but one stood in my way and asked if I actually thought I was going to leave without answering them. I began to wonder if I was going to be robbed or assaulted when they first approached and at this point it seemed like they would prevent me from leaving. I lifted my shirt and placed my hand on a pistol I was legally able to conceal carry and said yes I would be leaving. They backed away from me but continued to yell things at me as I left the area. I never pulled the gun out, but them knowing I had it and may use it to stop them was enough to escape unharmed. Having less than 10 rounds against 3 attackers, especially if they were also armed, would have put me at a disadvantage if I was unable to accurately hit my targets initially and they continued to Pursue me.
- Yes, I was in Illinois, which does not honor Indiana concealed carry. I had to leave my firearm at home. This was truly the only time in my life I felt I needed to actually use a firearm, but almost was killed. 4 men (3 with guns displayed and 1 with a knife in his hand) were walking up to me fast in a parking lot screaming stop and give me everything you have. The parking lot was near empty, and dark outside. I was able

to unlock my car while running, start the car and speed off. Just as I got in the car, I had just enough time to lock the door before the 3 men pointed their guns at the car and the other was stabbing the window with a knife. They intended to rob and kill me. A couple rounds were fired as I sped off. I would have needed minimally 10 rounds if I had discharged given their distancing. I almost died because of Illinois law and my street smarts and luck was the only thing that saved me

- Yes An incident occurred when a man was drunk and crashed his car in front of me while I was carrying my 2 small children. A large group of his friends tried to get the drunk away before the police arrived. A fight started with them punching my elderly dad and threatened my elderly mother with violence.
- I was confronted then attacked by a group of about 12 teens when I was a teenager. They kicked me and caused a severe head injury and fractured ribs. I was defenseless. Being able to brandish a weapon with the capacity to take on a group of that size would have deterred their next step of physically assaulting me
- The two large males that attempted to break into my home. Much larger than myself. A 9mm would take several shots to slow down either and/or both.
- Yes. I am a 5'2" disabled female. I was stalked by a homeless drug addict. He was detained 4-5 times due to red behavior because he was high on methamphetamine. This person could have potentially done great harm to me. Meth addicts don't always go down easy. Sometimes it takes numerous rounds to get them down.
- My brother and I were robbed at gun point when one of the men got in the car with me after my brother got out of the car. The man had already told my brother that he wanted his money and that there were other people watching across the parking lot in case he had any problems with us. So when my brother got out, that man got in with a gun and stuck it right into my right side. He told me not to look at him and to give him all my money. With the other men standing in different positions in the parking lot my brother could have tried to shoot them (or at them) to try and scare them off

and if he could have had a larger capacity magazine he could have been able to fire more rounds at them to keep them away while we tried to get help from someone.

Finally, it is worth noting that, although a majority of these scenarios involve the prospect of defending against criminal aggression, a number involve defending against animals. The pilot survey in Vermont similarly documented a number of incidents involving animals (see Appendix A). This is a phenomenon that has been largely neglected in the scholarly literature examining the value of firearms for self-defense, and it would be helpful for future research to evaluate the frequency with which firearms are employed in defense against animal threats.

5.3 Ownership of AR-15 and similarly styled rifles

All gun owners were asked, “Have you ever owned an AR-15 or similarly styled rifle? You can include any rifles of this style that have been modified or moved to be compliant with local law.” 30.2% of gun owners, about 24.6 million people, indicated that they have owned an AR-15 or similarly styled rifle. Using survey weights based on in-survey demographics of firearms ownership has no effect on this estimate. Respondents were then asked to indicate how many of such rifles they have owned. Approximately 99.7% indicated owning under 100 and 98.4% under 10. In order to provide a conservative estimate of ownership rates and to ensure that average estimates are not skewed by a small number of large outliers, we disregard the 0.3% that indicate owning over 100 in calculating average ownership numbers. Among those who indicate having owned AR-15 and similarly styled rifles, they indicate having owned an average of 1.8, with the median owner having owned 1. This suggests that up to 44 million AR-15 styled rifles have been owned by U.S. gun owners. Note, again, that this estimate is based on a question that asks whether someone has ever owned such a rifle, so this estimate should be interpreted as an upper bound on current ownership given that some rifles may have been resold.

Figure 15 shows the percentage of respondents who indicated that they owned AR-15 styled rifles for the following purposes: defense outside the home (34.6%), home defense (61.9%), competitive shooting sports (32.1%), recreational target shooting (66.0%), hunting (50.5%), and other (5.1%). Note that respondents could choose multiple purposes for which

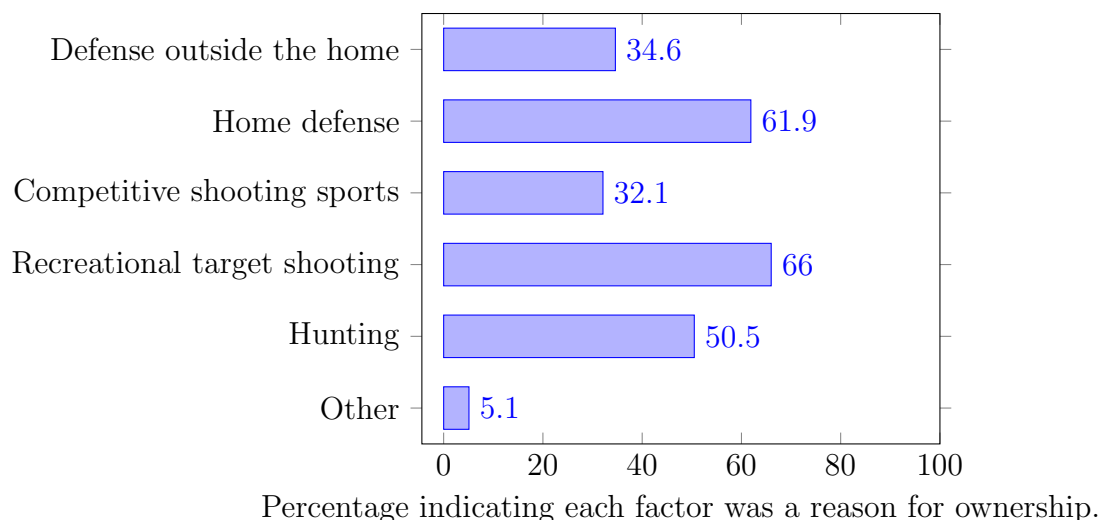


Figure 15: Purposes indicated for owning AR-15 styled rifles.

they owned such firearms. Home defense and recreational target shooting were the two most common reasons indicated for owning these magazines, with approximately two-thirds of respondents identifying each of these as a rationale for ownership.

Demographic Group	Proportion Owned AR-15 Styled Rifle	95% Confidence Interval
White	29.6%	28.9% – 30.4%
Black	34.0%	31.0% – 37.1%
Asian	29.2%	24.6% – 34.2%
Native American	35.4%	30.8% – 40.3%
Pacific Islander	48.4%	36.3% – 60.7%
Other Ethnic Ancestry	34.6%	28.8% – 41.1%
Hispanic (any ancestry)	38.3%	35.0% – 41.8%
Male	36.4%	35.5% – 37.4%
Female	21.3%	20.3% – 22.3%

Table 5: Demographics of ownership of AR-15 styled rifles.

Table 5 shows the breakdown of ownership of AR-15 styled rifles across different demographic segments. As this table demonstrates, AR-15 styled rifles are commonly owned at

high rates across many different demographic groups.

Table 6 shows the percentage of gun owners in each state who indicated that they have owned AR-15 styled rifles. Note that this question explicitly instructed respondents that “You can include any rifles of this style that have been modified or moved to be compliant with local law.” Thus, as with magazines, these answers can include firearms that are kept in other states, as well as firearms that were grandfathered in or modified to be compliant with local law, or respondents who have since sold or disposed of such guns. This presumably explains the relatively high rates of ownership in states that restrict the purchase or ownership of such firearms.

6 Conclusion

This report summarizes the main findings of the most comprehensive survey of firearms ownership and use conducted in the United States to date. While many of its estimates corroborate prior survey research in this area, it also provides unique insights that are relevant to timely public policy debates, particularly regarding the defensive use of firearms and the ownership and use of AR-15 styled rifles and magazines that hold over 10 rounds.

This survey finds firearms ownership rates slightly above those documented before the Covid-19 pandemic, which is consistent with other recent scholarly research finding a large surge in firearms purchases during the pandemic, particularly among first time buyers (Crifasi et al., 2021; Miller et al., 2022).

In sum, about 31.9% of U.S. adults, or 81.4 million Americans, own over 415 million firearms, consisting of approximately 171 million handguns, 146 million rifles, and 98 million shotguns. About 24.6 million individuals have owned a up to 44 million AR-15 and similarly styled rifles, and 39 million individuals have owned up to 542 million magazines that hold over 10 rounds. Approximately a third of gun owners (31.1%) have used a firearm to defend themselves or their property, often on more than one occasion, and guns are used defensively by firearms owners in approximately 1.67 million incidents per year. A majority of gun owners (56.2%) indicate that they carry a handgun for self- defense in at least some circumstances, and about 35% of gun owners report carrying a handgun with some frequency.

State	Owned AR-15 Style Rifle	95% Confidence Interval
Alabama	28.9%	24.1% – 34.3%
Alaska	37.0%	24.4% – 51.6%
Arizona	28.8%	24.2% – 34.0%
Arkansas	35.0%	28.7% – 41.8%
California	37.5%	34.8% – 40.2%
Colorado	33.3%	27.7% – 39.5%
Connecticut	21.8%	15.3% – 30.2%
Delaware	20.3%	12.6% – 30.9%
District of Columbia	30.0%	14.1% – 52.7%
Florida	28.1%	25.5% – 30.9%
Georgia	31.4%	27.9% – 35.1%
Hawaii	34.6%	19.1% – 54.3%
Idaho	31.0%	23.3% – 40.0%
Illinois	32.6%	28.7% – 36.7%
Indiana	30.8%	26.5% – 35.5%
Iowa	27.1%	20.4% – 35.1%
Kansas	28.4%	22.4% – 35.4%
Kentucky	29.9%	25.2% – 35.1%
Louisiana	27.5%	22.0% – 33.7%
Maine	22.0%	14.6% – 31.6%
Maryland	29.9%	23.7% – 36.9%
Massachusetts	33.8%	26.9% – 41.4%
Michigan	24.9%	21.5% – 28.6%
Minnesota	20.7%	16.1% – 26.3%
Mississippi	30.4%	23.8% – 38.0%
Missouri	28.0%	23.8% – 32.7%
Montana	26.8%	16.8% – 39.8%
Nebraska	22.4%	15.3% – 31.8%
Nevada	42.4%	34.6% – 50.6%
New Hampshire	23.2%	14.0% – 36.0%
New Jersey	30.7%	25.7% – 36.2%
New Mexico	29.5%	19.4% – 42.1%
New York	37.8%	34.8% – 41.0%
North Carolina	25.6%	22.2% – 29.4%
North Dakota	44.4%	24.0% – 67.0%
Ohio	25.9%	22.7% – 29.4%
Oklahoma	29.3%	24.1% – 35.0%
Oregon	25.6%	20.0% – 32.2%
Pennsylvania	24.4%	21.3% – 27.8%
Rhode Island	29.7%	17.3% – 46.1%
South Carolina	25.3%	21.0% – 30.2%
South Dakota	35.8%	26.8% – 45.9%
Tennessee	28.9%	24.8% – 33.3%
Texas	36.0%	33.3% – 38.7%
Utah	24.8%	17.9% – 33.2%
Virginia	26.0%	21.9% – 30.6%
Washington	35.3%	30.3% – 40.6%
West Virginia	27.4%	21.3% – 34.5%
Wisconsin	19.7%	15.6% – 24.6%
Wyoming	36.1%	25.9% – 47.8%

Table 6: Percent of gun owners who have indicated that they have ever owned an AR-15 styled rifle by state. Note that this includes rifles that an owner holds in other locations if there are local ownership restrictions and rifles modified to be compliant with local laws.

Finally, the demographics of firearms ownership and defensive use are diverse, with different demographic groups commonly owning and using firearms at substantial rates.

References

- Deborah Azrael, Lisa Hepburn, David Hemenway, and Matthew Miller. The stock and flow of us firearms: results from the 2015 national firearms survey. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 3(5):38–57, 2017.
- Anna Brown. *America’s Complex Relationship With Guns: An In-depth Look at the Attitudes and Experiences of US Adults*. Pew Research Center, 2017.
- Philip J Cook and Jens Ludwig. *Guns in America: results of a comprehensive national survey on firearms ownership and use*. Police Foundation Washington, DC, 1996.
- Cassandra K Crifasi, Julie A Ward, Emma E McGinty, Daniel W Webster, and Colleen L Barry. Gun purchasing behaviours during the initial phase of the covid-19 pandemic, march to mid-july 2020. *International review of psychiatry*, 33(7):593–597, 2021.
- Gallup. *In Depth: Topics, Guns*. <https://news.gallup.com/poll/1645/guns.aspx> , <https://news.gallup.com/poll/264932/percentage-americans-own-guns.aspx>, 2021.
- David Hemenway. Survey research and self-defense gun use: an explanation of extreme overestimates. *J. Crim. L. & Criminology*, 87:1430, 1996.
- Lisa Hepburn, Matthew Miller, Deborah Azrael, and David Hemenway. The us gun stock: results from the 2004 national firearms survey. *Injury prevention*, 13(1):15–19, 2007.
- Gary Kleck and Marc Gertz. Armed resistance to crime: the prevalence and nature of self-defense with a gun. *J. Crim. L. & Criminology*, 86:150, 1995.
- Gary Kleck and Marc Gertz. Carrying guns for protection: results from the national self-defense survey. *Journal of Research in Crime and Delinquency*, 35(2):193–224, 1998.
- Jens Ludwig, Philip J Cook, and Tom W Smith. The gender gap in reporting household gun ownership. *American Journal of Public Health*, 88(11):1715–1718, 1998.
- Matthew Miller, Wilson Zhang, and Deborah Azrael. Firearm purchasing during the covid-19 pandemic: results from the 2021 national firearms survey. *Annals of internal medicine*, 175(2):219–225, 2022.

Ann P Rafferty, John C Thrush, Patricia K Smith, and Harry B McGee. Validity of a household gun question in a telephone survey. *Public Health Reports*, 110(3):282, 1995.

Paul Spector. Social desirability bias. *The SAGE encyclopedia of social science research methods*, 2004.

Appendix A: Vermont Pilot Survey

An initial version of this survey was fielded in Vermont. We report below the top line results from the Vermont survey, which closely mirror the results of the national survey.

In sum, 572 Vermont residents were surveyed, of which 163 indicated owning firearms. The survey sample represented the demographics of Vermont well on all dimensions except gender, as women were over represented and comprised 65.2% of respondents. Thus, weights were employed for gender.

With weighting employed, we find that 30% of Vermont residents own a firearm. Given that the adult population of Vermont is approximately 486,000, this suggest that there are over 145,600 firearms owners in Vermont. 42.1% of Vermont firearms owners are estimated to be female and 57.9% male.

As Figure 16 illustrates, almost a third of gun owners (29.3%) reported having used a firearm to defend themselves or their property (not counting incidents that were due to military service, police work, or work as a security guard). In nearly half of these defensive gun uses (45.9%), respondents reported facing multiple assailants. 85.8% of all incidents were resolved without the firearm owner having to fire a shot (e.g. by simply showing a firearm or verbally threatening to use it).

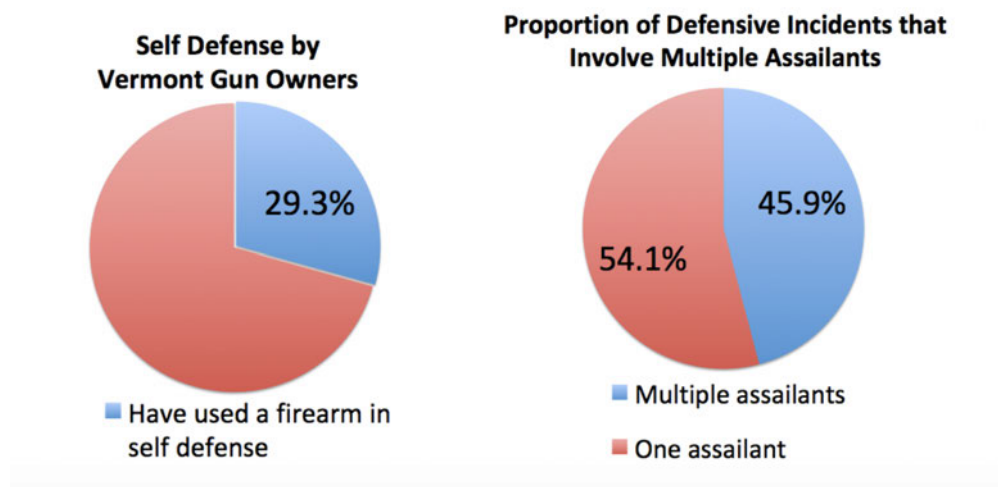


Figure 16: Proportion of gun owners in Vermont who have use a firearm in self-defense and number of assailants involved.

Sample of Vermont responses to open ended question prompt of “Have you ever been in a situation (including any referenced in earlier responses) in which it would have been useful for defensive purposes to have a firearm with a magazine capacity in excess of 10 rounds?”:

- in the first incident it was five to one. I was outnumbered. three rounds per person if needed
- The time I was assaulted by 10 individuals.
- Yes. We have bear that frequently come to our home. They’ve attempted to get into my truck, they have come onto our porch thru the dog door (XL size) they have been in our chicken coops and in our garage. They have damaged many items, destroyed gas grills and threatened my dogs and children. Sometimes a warning shot isn’t enough. And if, God forbid, the bear turned and started to attack us multiple bullets would be needed to stop him.
- About 6 individuals broke into my house one night. I locked myself in my room and they tried to break my door down. I threatened them with use of deadly force, but they kept trying. One of them was outside and broke my bedroom window and I aimed my shotgun at him and he ran off. I threatened again with the sound of charging my shotgun that they knew I wasn’t bluffing and they all fled. Had they entered with the intent to kill my family and I, then we would have been out numbered. If there was an exchange of gun fire, I wouldn’t want to have the restriction of reloading within the time I needed to protect my family and myself. Outgun the enemy or the enemy will surely outgun you. Limiting everyone’s right to weapons is not the answer, and clearly this attempt to ban high capacity magazines is just the catalyst to a government gun grab for easier totalitarian control of the population.
- Yes, i had two run ins with a mountain lion.
- We had a home invasion two times in a month
- Yes. We live in VT. Every time I fired my gun in defense of my property it was to deter bears from damaging my property. It takes more than 1 shot to scare a bear. If

it charges you or your family it'll definitely take a bunch of shots to stop the bear.

- Yes. Just because there are 10 rounds in a magazine does not mean all will be on target during a self defense incident. In 2012 while I was in college in Connecticut, I got jumped by 4 people in Hartford ct. I had nothing on me to defend myself. The men all threatened me with knives and handguns. I wish I was able to carry a firearm at that point.

Appendix B: Sampling Proportions With and Without Weights for National Survey

Gender	Initial Sample Proportions	Census Based Weighted Proportions
Male	49.32%	49.23%
Female	50.68%	50.77%

Age Range	Initial Sample Proportions	Census Based Weighted Proportions
18-20	7.89%	5.04%
21-25	8.11%	8.58%
26-30	7.30%	9.24%
31-35	11.67%	8.67%
36-40	12.66%	8.44%
41-45	8.49%	7.70%
46-50	6.46%	8.09%
51-55	6.37%	8.13%
56-60	7.39%	8.52%
61-65	7.67%	7.87%
66-70	8.03%	6.59%
71-75	5.07%	5.13%
76-80	1.94%	3.50%
Over 80	0.93%	4.49%

Annual Household Income	Initial Sample Proportions	Census Based Weighted Proportions
Less than \$10,000	8.87%	3.40%
\$10,000-20,000	8.95%	4.89%
\$20,000-30,000	9.69%	6.26%
\$30,000-40,000	8.78%	7.06%
\$40,000-50,000	7.44%	7.21%
\$50,000-60,000	7.72%	6.96%
\$60,000-70,000	6.00%	6.96%
\$70,000-80,000	6.37%	6.37%
\$80,000-90,000	4.51%	5.76%
\$90,000-100,000	5.89%	5.76%
\$100,000-150,000	17.67%	19.11%
Over \$150,000	8.12%	20.23%

State of Residence	Initial Sample Proportions	Census Based Weighted Proportions
Alabama	1.83%	1.52%
Alaska	0.39%	0.22%
Arizona	2.10%	2.16%
Arkansas	1.10%	0.91%
California	9.75%	11.95%
Colorado	1.59%	1.75%
Connecticut	1.23%	1.09%
Delaware	0.56%	0.30%
District of Columbia	0.27%	0.21%
Florida	7.29%	6.51%
Georgia	3.67%	3.24%
Hawaii	0.36%	0.44%
Idaho	0.44%	0.56%
Illinois	4.14%	3.87%
Indiana	2.13%	2.05%
Iowa	0.91%	0.96%
Kansas	0.92%	0.89%
Kentucky	1.61%	1.36%
Louisiana	1.23%	1.41%
Maine	0.51%	0.41%
Maryland	1.67%	1.87%
Massachusetts	1.88%	2.13%
Michigan	3.21%	3.05%
Minnesota	1.36%	1.73%
Mississippi	0.83%	0.90%
Missouri	1.93%	1.86%
Montana	0.25%	0.33%
Nebraska	0.53%	0.59%
Nevada	0.90%	0.94%
New Hampshire	0.40%	0.42%
New Jersey	2.97%	2.81%
New Mexico	0.36%	0.64%
New York	8.09%	6.11%
North Carolina	3.18%	3.16%
North Dakota	0.13%	0.24%
Ohio	4.13%	3.57%
Oklahoma	1.32%	1.20%
Oregon	1.05%	1.28%
Pennsylvania	4.30%	3.93%
Rhode Island	0.33%	0.33%
South Carolina	1.68%	1.55%
South Dakota	0.48%	0.27%
Tennessee	2.18%	2.09%
Texas	6.91%	8.81%
Utah	0.56%	0.99%
Virginia	2.43%	2.61%
Washington	2.03%	2.33%
West Virginia	0.71%	0.54%
Wisconsin	1.83%	1.78%
Wyoming	0.32%	0.17%

Race	Initial Sample Proportions	Census Based Weighted Proportions
White	81.26%	76.30%
Black	9.85%	13.40%
Asian	3.98%	5.90%
Native American	2.19%	1.30%
Pacific Islander	0.49%	0.20%
Other	2.22%	2.90%

EXHIBIT 16

This Washington Post-Ipsos poll was conducted Sept. 30-Oct. 11, 2022, among a random national sample of 2,104 gun owners, including 399 AR-15-style rifle owners. The sample was drawn through Ipsos KnowledgePanel, an ongoing survey panel recruited through random sampling of U.S. households. Results among gun owners overall have a margin of sampling error of plus or minus 2.5 percentage points; the error margin is 5.5 points for the sample of AR-15-style rifle owners. Sampling, field work and data processing were conducted by Ipsos of Washington, D.C.

(Full methodological details appended at the end.)

*= less than 0.5 percent

1. (AMONG GUN OWNERS) What types of firearms do you own? *Please select all that apply.*

	Handguns, such as pistols or revolvers	Hunting rifles or shotguns	AR-15-style rifles, including any semi-automatic weapon built on a common AR-15 platform	Antique firearms	Other
10/11/22	80	62	20	16	2
AR-15 owners	95	79	100	33	2

2. (AMONG AR-15 OWNERS) In a few words, what are the main reasons you own an AR-15-style rifle?

	10/11/22
Self defense/Protect home/self/family	33
Fun/Recreation/Sport or hobby shooting	15
Target shooting/Take to range/Competition	15
Second Amendment/It's my right/Because I can	12
Hunting	12
Like the way it looks/Like it/Because I want to	9
Easy to use/Simple/Accurate	6
Used one in the military/ as a police officer/Use for work	4
Customizable/Platform/Versatile	4
In case of chaos/Government tyranny	3
Was a gift/Inherited it	2
Collection/Collector	2
Angers liberals/Because people want to ban them/ Because they make other people afraid	2
Other	5
No answer	2

3. (AMONG AR-15 OWNERS) Is each of the following a major reason, minor reason or not a reason why you own an AR-15-style rifle?

10/11/22 - Summary table among AR-15-style rifle owners

	Major reason	Minor reason	Not a reason	No opinion
a. Target shooting	60	30	10	0
b. Hunting	18	30	52	0
c. Ease of customizing or modifying the rifle	25	30	45	0
d. Protect self, family and property	65	26	8	*
e. Potential for new laws restricting AR-15 sales	22	28	49	0
f. In case law and order				

breaks down	42	32	26	0
g. It is fun to shoot	63	27	10	*
h. It is important to who I am as an American	36	24	40	*

4. (AMONG AR-15 OWNERS) How often do you fire your AR-15-style rifle(s)?

	Less than once a year	Once or twice a year	A few times a year	About once a month	More than once a month	No op.
10/11/22	22	16	42	10	10	0

5. (AMONG GUN OWNERS) As far as you know, how many of your friends, if any, own an AR-15-style rifle?

	All or most	Some	Only a few	None	No opinion
10/11/22	9	26	27	37	1
AR-15 owners	30	45	20	5	*

6. (AMONG AR-15 OWNERS) In a few words, what do you think are the biggest misunderstandings about AR-15-style rifles in the general public or media?

RESULTS FORTHCOMING WHEN CODING IS COMPLETE

7. (AMONG GUN OWNERS) Have you ever served in the U.S. Armed Forces, Reserves or National Guard?

	Never served in military	NET	----- Served in military ----- On active duty for training in Reserves or National Guard	Now on active duty	Active duty in the past but not now	No op.
10/11/22	80	20	1	*	17	*
AR-15 owners	72	28	5	0	23	0

8. (AMONG PEOPLE WHO WERE ACTIVE DUTY MILITARY NOW OR IN THE PAST) In military training or combat, did you ever fire an M4 or M16?

	Yes	No	No opinion
10/11/22	81	19	*
AR-15 owners	89	11	0

NET 7/8 among AR-15 owners

	NET	----- Served in military ----- Fired M4 or M16	Didn't fire M4 or M16	No opinion	Never served in military	No opinion
10/11/22	28	25	3	0	72	0

9. (AMONG AR-15 OWNERS WHO USED M4 OR M16 IN MILITARY TRAINING OR COMBAT) Did familiarity with the M4 or M16 increase your interest in owning an AR-15-style rifle?

	Yes	No	No opinion
10/11/22	55	45	0

NET 7/9 among AR-15 owners

	--- Fired M4 or M16 in military --- Increased	Didn't
--	--	--------

		interest	increase	No	Didn't fire	Never served	No
	NET	in AR-15	interest	opinion	M4 or M16	in military	opinion
10/11/22	25	14	11	0	3	72	0

*** END ***

METHODOLOGICAL DETAILS

This poll was jointly sponsored and funded by The Washington Post and Ipsos. It was conducted among a random sample of 2,104 U.S. adults 18 and older who reported they own a gun, of which 399 own an AR-15-style rifle. Interviews were conducted in English and Spanish. A sample of adults aged 18 years and older were screened for gun ownership and gun owners were asked if they own an AR-15.

The questionnaire was administered with the exact questions in the exact order as they appear in this document. Demographic questions are not shown. If a question was asked of a reduced base of the sample, a parenthetical preceding the question identifies the group asked.

Ipsos conducted sampling, interviewing and tabulation for the survey using the KnowledgePanel, a representative panel of adults aged 18 years and over living in the United States. The survey was conducted online among a sample from the KnowledgePanel, an ongoing survey panel recruited through random sampling of U.S. households through address-based sampling. Panel members who do not have internet access are provided with a tablet and internet service.

This survey uses statistical weighting procedures to account for deviations in the survey sample from known population characteristics, which helps correct for differential survey participation and random variation in samples. The general population adult sample was weighted to match the makeup of the population geodemographics to the sources below. The gun owner weight was then scaled to the number of respondents.

Source	Benchmarks
U.S. Census Bureau's 2019 American Community Survey (ACS)	Sex, region, metropolitan status, age, education, household income
U.S. Census Bureau's March 2022 Current Population Survey supplement (CPS)	Metropolitan status
Washington Post-ABC News telephone polls	Political party affiliation

The margin of sampling error for the sample of AR-15-style rifle owners, including the design effect is plus or minus 5.5 percentage points. Note that sampling error is only one of many potential sources of error in this or any other public opinion poll.

All error margins have been adjusted to account for the survey's design effect, which is 1.2. The design effect is a factor representing the survey's deviation from a simple random sample and takes into account decreases in precision due to sample design and weighting procedures. Surveys that do not incorporate a design effect overstate their precision.

The Washington Post is a charter member of AAPOR's Transparency Initiative, which recognizes organizations that disclose key methodological details on the research they produce.

Contact polls@washpost.com for further information about how The Washington Post conducts polls.



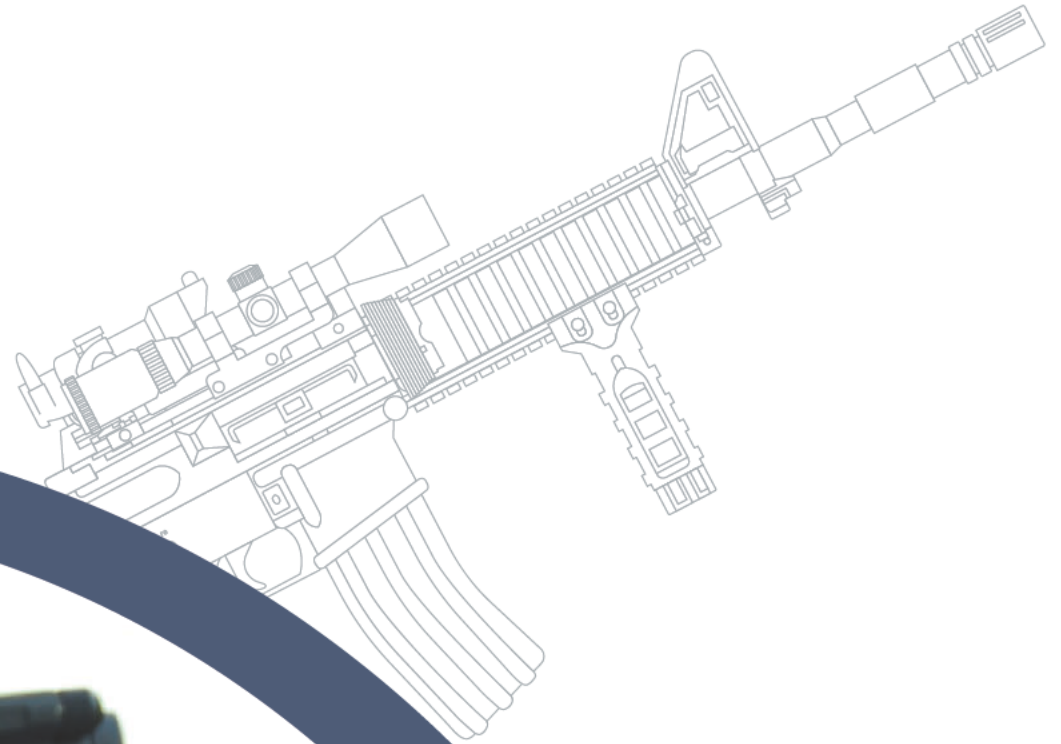
EXHIBIT 17

NSSF® Report

MODERN SPORTING RIFLE

COMPREHENSIVE CONSUMER REPORT

Ownership, Usage and Attitudes Toward
AR- and AK-Platform Modern Sporting Rifles



NSSF®
The Firearm Industry
Trade Association

NSSF MSR Consumer Study – Report of Findings

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Executive Summary

EXPERIENCE WITH MSRs

- Ownership & Platform: The median MSR user owns nearly 4 MSRs, with 97% of owners saying they own an AR-platform MSR. 38% own another MSR platform and 27% own an AK platform MSR.
- When MSR was first owned: Over 40% obtained their first MSR since 2009, with 11% obtaining their first MSR within the last 2 years. while 20% of MSR owners obtained their first MSR prior to 1999.
- Other Firearms Owned First: 99% of MSR owners used or obtained another firearm before an MSR; the most popular firearm owned is a handgun, which 88% of MSR owners held before obtaining a MSR.
- Introduction to MSRs: One-third of MSR owners became interested through their own personal accord. About 21% first gained interest through military or their job, and another 20% through family & friends.
- Range membership: 52% of MSR owners are current members of a shooting range. 28% have never been a member, with the final 20% being former members.
- Reasons for ownership: Recreational target shooting was rated as the most important reasons for owning an MSR. Big game hunting and professional/job-related use were rated as least important.

MOST RECENTLY ACQUIRED MSR

- When Acquired: 48% of MSR owners said they obtained their most recently acquired MSR within the last two years (2021 or 2021), with 31% saying they obtained a MSR in 2021.
- Platform: Nearly 9 out of 10 MSR owners said the most recent MSR they acquired was an AR platform.

NSSF MSR Consumer Study – Report of Findings

Executive Summary

MOST RECENTLY ACQUIRED MSR (cont.)

- New/Used MSR: 83% of MSR owners said they bought their most recent MSR by purchasing it new.
- Place of purchase: 30% of owners bought their most recent MSR from a independent (mom & pop) retail store. 22% assembled their MSR using purchases of different parts, and 19% used the internet/website. The most popular retailers & online sites used were Palmetto State Armory, Gunbroker.com, Cabela's, and Sportsman's Warehouse.
- Price: The average price for a new MSR paid by owners was \$1,071; half of MSR owners paid between \$500 and \$1000 for their most recently acquired MSR.
- Brand: Survey data indicates the MSR market is highly fragmented. 11% of MSR owners said Palmetto was the brand of their most recently acquired MSR.
- Caliber – 60% of respondents said the caliber of their most recently acquired MSR is .223 / 5.56 mm.
- Reasons for buying- MSR owners said reliability, accuracy, and fun were the most important reasons for purchasing their most recently acquired MSR. The least important reasons were recommendations from a retailer and MSRs owned by family/friends.
- Accessories: 86% of MSR owners have their most recently acquired MSR customized to some extent, with 70% having 1-3 accessories. 75% of those with accessories added them to their MSR within 12 months after purchase. The average spent for accessories by owners on their most recently acquired MSR is \$618.
- Optics used: 61% of MSR owners have a scope equipped as a primary optics, while 55% utilize a red dot.

NSSF MSR Consumer Study – Report of Findings

Executive Summary

MOST RECENTLY ACQUIRED MSR (cont.)

- Scope: the most common scopes used by MSR owners are the 3-9x power scope and the 1-4x power scope.
- Magazine capacity: Over half (52%) of MSR owners stated the magazine capacity of their MSR is 30 rounds. When asked why they chose their respective capacity, most frequent responses were related to popularity/standard and being readily available.
- Stock: Approximately two-thirds of MSR owners have a collapsible/folding stock on their MSR.
- Receiver: 81% of owners have a flat top upper receiver.
- Handguard: The most common type of handguard is a free floating with rails handguard, used by 43% of respondents on their most recently acquired MSR.
- Finish color: 3 out of 4 owners have a black finish color on their MSR.
- Barrel: 67% have a threaded barrel on their MSR.
- Barrel accessories: Most used barrel accessories are flash hider (39% of MSR owners) and muzzle brake/compensator (37%).
- Barrel length: 75% have a MSR with a barrel length of 16" to 20".
- Operating system: The most recently acquired MSR for 59% of owners operates by direct gas impingement.

NSSF MSR Consumer Study – Report of Findings

Executive Summary

MOST RECENTLY ACQUIRED MSR (cont.)

- Storage: 67% store their MSR unloaded and secured in a safe, lock box, or with a trigger lock. An additional 19% store their MSR loaded and secured in a safe, lock box, or with a trigger lock.
- Likelihood to buy: On a scale from 1 to 10, where 1 is “not at all likely” and 10 is “very likely”, the average likelihood rating given by MSR owners that they’ll buy a MSR in the next 12 months is 6.2, slightly more to the ‘likely’ end of the scale.
- Accessories owned: The most common accessories currently owned by MSR owners are gun cleaning kits, extra magazines, targets, and a soft carrying case. The accessory MSR owners most frequently said they planned to buy in the next 12 months is a suppressor/silencer. About 70% of MSR owners do not own and do not plan on buying a laser designator or night vision/thermal scope in the next 12 months.

USAGE AND ACTIVITIES

- Use: 88% of MSR owners used/shot their MSR(s) in the last 12 months. The average number of times used was 14, just over once a month. Compared to the 12 months before that, 41% said their MSR use was “about the same” while 38% said it was less.
- Desired usage: 75% of MSR owners said they did not use their MSR as much as they would like over the past 12 months. The most important factors preventing owners from using their MSR more are related to ammunition: lack of availability and cost.
- Activities: The most popular activity by MSR owners is target shooting — 54% said they did target shooting at a private range, while 49% said they did target shooting at a public range.
- Ammo used: Roughly 70% of MSR owners used budget factory and premium factory loads in the last 12 months. The ammo breakdown for an average MSR user is made up of 42% budget factory loads, 32% premium factory loads, 17% handloads/reloads, and 9% import ammo. The average number of rounds used by MSR owners in the last 12 months is 907 rounds. In the next 12 months, MSR owners project they’ll fire 984 rounds.

NSSF MSR Consumer Study – Report of Findings

Executive Summary

USAGE AND ACTIVITIES (cont.)

- Ammo purchases: The average number of ammo rounds typically purchased by MSR owners is 637.
- Ammo on hand: Nearly half (45%) of MSR owners own/keep more than 1,000 rounds on hand.
- Ammo reloads: 6 out of 10 MSR owners do not reload their own ammunition. Of the 40% who do, the average percentage of ammunition they reload is 53%.
- Activities – Distance: The most frequent distance that MSR owners hunt/target shoot is at 100–300 yards.
- Target shooting alone vs with others: 43% of MSR owners who go target shooting typically go with 1 other person. 27% go alone.
- Favorite part about owning MSR: MSR owners said their favorite part about owning a MSR was: fun/enjoyment of shooting, exercising freedom/2A rights, ease of use, and reliability.

RESPONDENT PROFILE

- Organizations: 61% of MSR owners are members of or recently donated to the NRA, the most frequently chosen organization. 21% of MSR owners are not members of or recently donated to any firearm organizations. 12% are members or recently donated to the NSSF.
- Military/Law-Enforcement: 38% of MSR owners are active/retired member of law enforcement or the military.
- Age/Gender/Race: 96% of MSR owners are Male. The average age of MSR owners is 55 years old. 88% are White/Caucasian.
- Marital status: 74% of MSR owners are married. Of these MSR owners, over half say their spouse accompanies them for target shooting. 24% say their spouse has no interest in target shooting or firearms.

Executive Summary

RESPONDENT PROFILE (cont.)

- Education: 45% of MSR owners have attained at least a bachelors degree. One-quarter have attended some college, but did not graduate.
- Income: The average yearly household income for MSR owners is \$110,934. More than half are in households with an annual income of greater than \$85,000.
- Children in Household: 62% of MSR owners do not have any children living with them.
- State: The states with the most respondents were Texas (9%), California (5%), and Florida (5%).

Methodology

In 2020, the National Shooting Sports Foundation (NSSF) contracted Sports Marketing Surveys for an online consumer survey on modern sporting rifles (MSRs) that was last carried out in 2013. Due to the COVID pandemic and personnel changes at NSSF, this survey was not able to be administered until December 2021. The aim is to provide the NSSF and manufacturers insights on current consumer needs and uses of MSRs as well as educate those influencing public policy in the effort to preserve our constitutional rights.

The online survey covered various aspects of MSR ownership, behavior, and attitudes. The NSSF promoted the survey via a partner email distribution list. A random drawing to win one of four \$250 Mastercard prepaid gift cards was included to incentivize participation. The term “Modern Sporting Rifle” was clearly defined as AR- or AK-platform rifles such as AR-15, AR-10, AK-47, AK-74 and did not include non-rifle firearms such as AR pistols, etc. Photographs of both AR- and AK-platform MSRs were shown on the survey landing page. All responses from those under 18 years old or said they did not own at least 1 MSR were removed from the analysis.

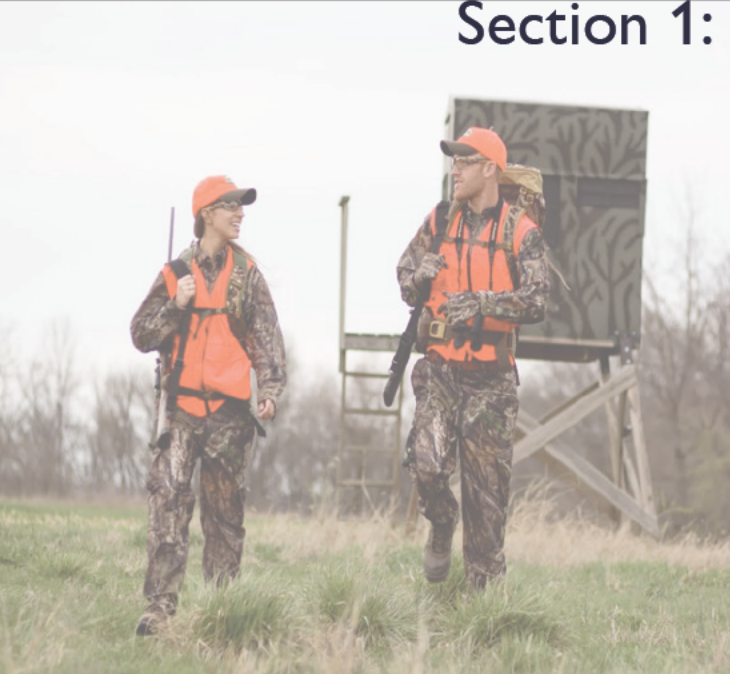
The survey was live from December 9, 2021 to January 2, 2022.

- **Completed Surveys: 2,421**
- **Usable responses for analysis: 2,185**

NSSF MSR Consumer Study - Report of Findings

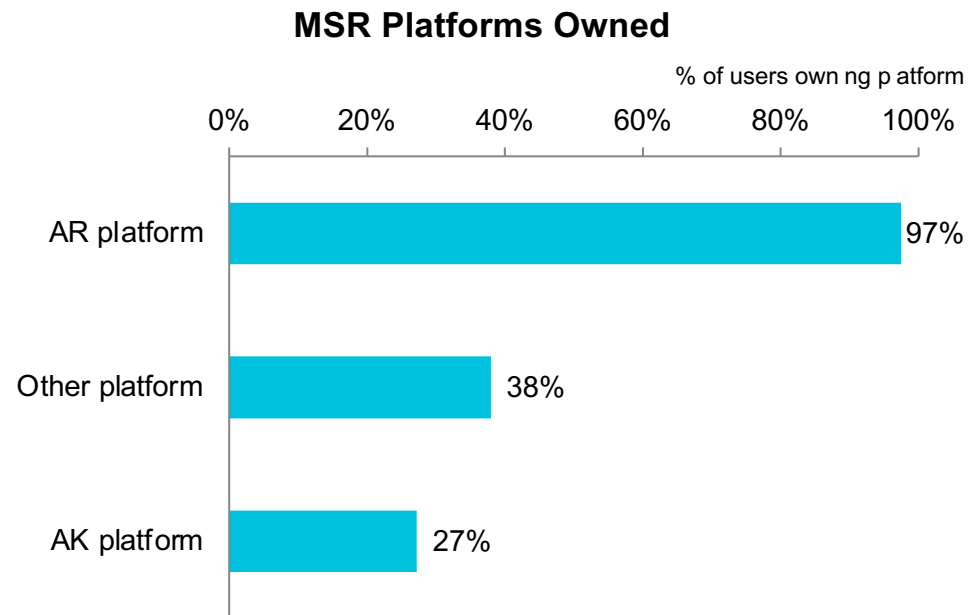


Section 1: Experience with Modern Sporting Rifles



NSSF MSR Consumer Study – Report of Findings

Modern Sporting Rifle Ownership: Platforms



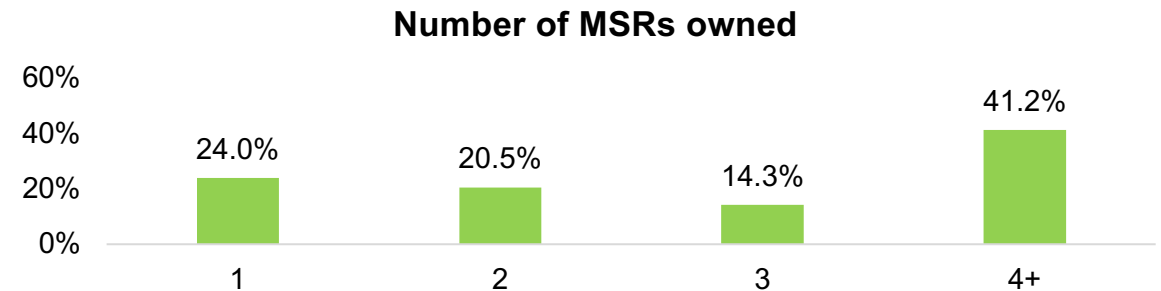
Platform	Average Number of MSRs owned (must own at least one of specified platform)
AR platform	2.7
Other platform	2.3
AK platform	1.5

Average number of MSRs owned: 3.8

- AR – 2.6
- Other – 0.8
- AK – 0.4

Median of all MSRs owned: 3

(may own zero of one or more platform, but must at least own one MSR)



Trend – Average Number of MSRs owned

2010: 2.6

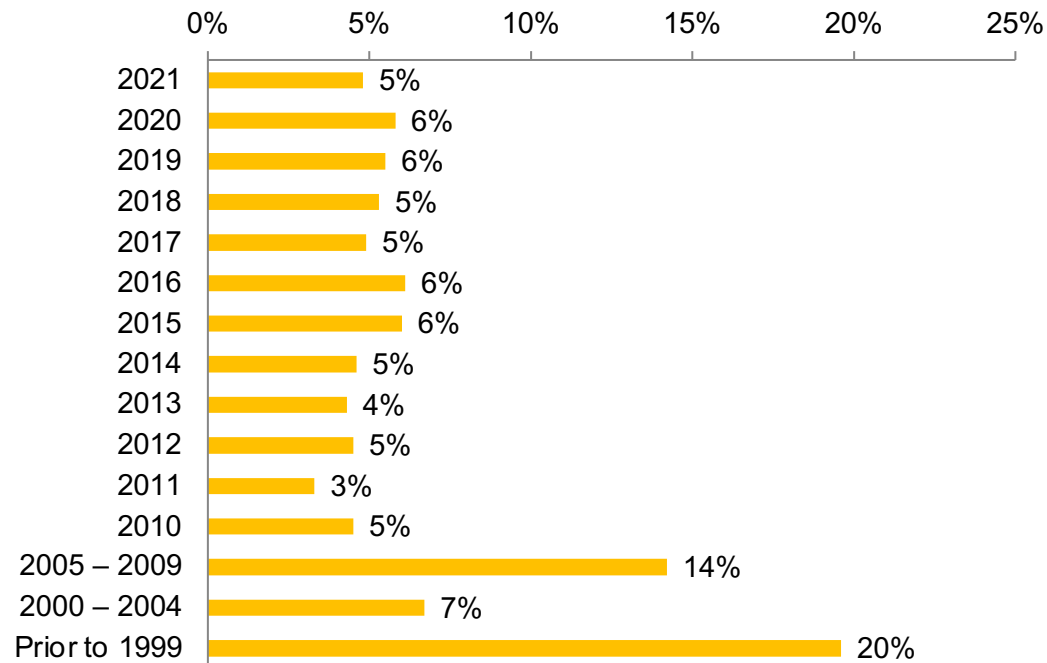
2013: 3.1

2021: 3.8

NSSF MSR Consumer Study – Report of Findings

Modern Sporting Rifle Ownership: Experience

When did you obtain your FIRST MSR?



By Number of MSRs Owned

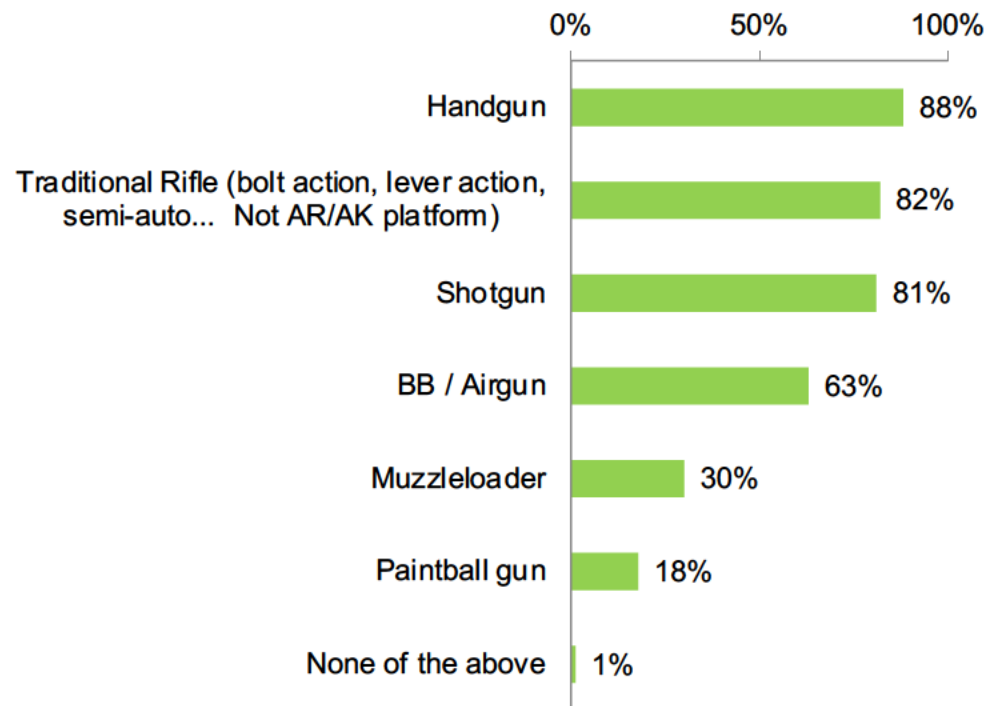
	1 MSR	2	3	4	5+
2021	14%	3%	3%	1%	1%
2020	13%	7%	3%	1%	2%
2019	9%	7%	5%	4%	2%
2018	9%	7%	5%	5%	2%
2017	8%	5%	5%	4%	3%
2016	7%	8%	8%	6%	3%
2015	7%	8%	6%	3%	5%
2014	5%	7%	3%	4%	3%
2013	3%	5%	6%	4%	4%
2012	4%	4%	4%	7%	5%
2011	2%	4%	4%	4%	4%
2010	2%	4%	7%	4%	6%
2005 – 2009	8%	13%	15%	15%	19%
2000 – 2004	3%	4%	7%	9%	11%
Prior to 1999	7%	13%	20%	28%	30%

- 20% of MSR owners obtained their first MSR before 1999. Over 40% have owned theirs since 2009.
- 11% obtained their first MSR within the last two years.
- 26% of those who own 1 MSR obtained it in 2020 or 2021.

NSSF MSR Consumer Study - Report of Findings

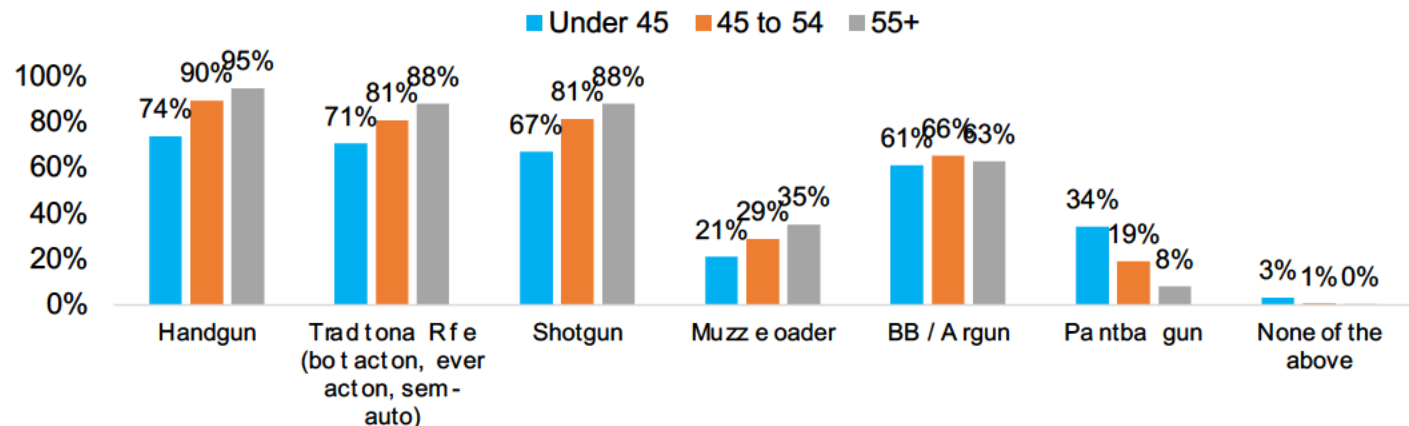
Modern Sporting Rifle Ownership: Experience

Firearms Used/Owned BEFORE obtaining a MSR



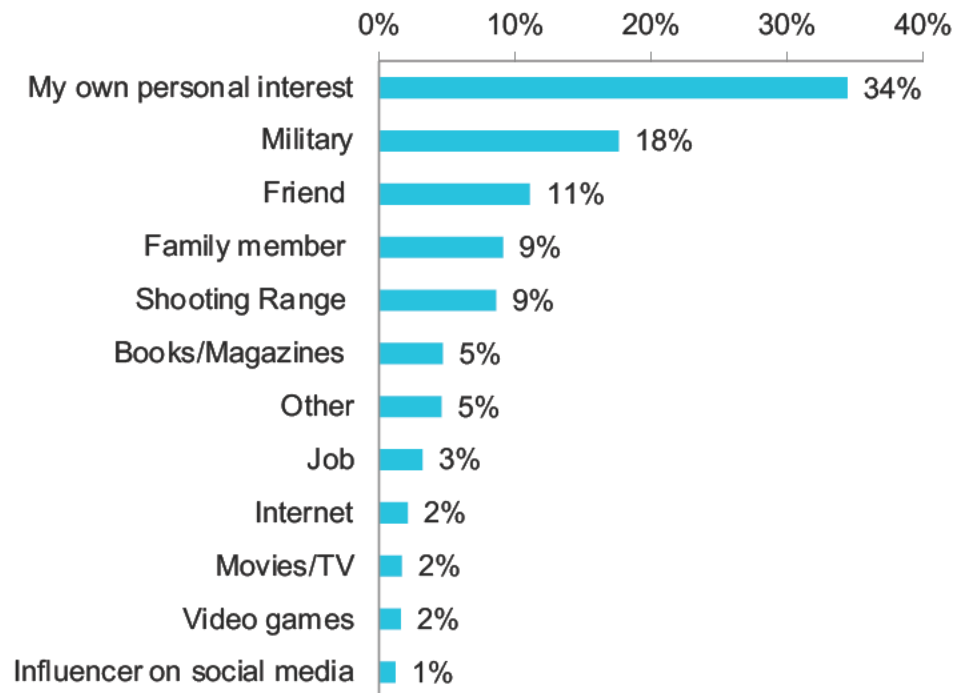
- Handguns are the most popular firearm used/owned before obtaining an MSR, with 88% of MSR owners selecting.
- Traditional rifles were also first used/owned by 82% of MSR owners.
- Younger MSR owners show less ownership of other firearm types before a MSR compared to other age groups.

Firearms Used Before MSR - by Age

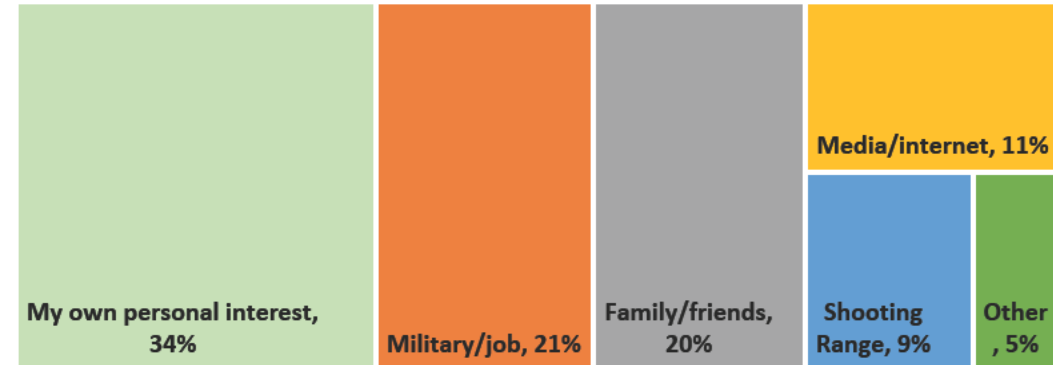


Modern Sporting Rifle Ownership: Experience

Introduction to MSRs: where did you first gain interest?



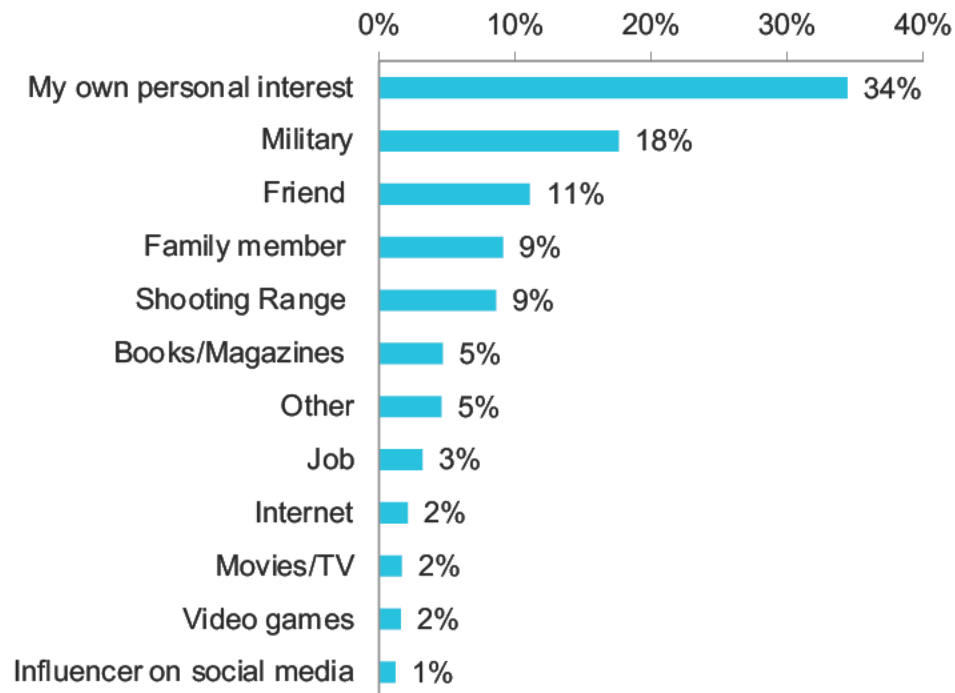
Introduction to MSRs (Grouped)



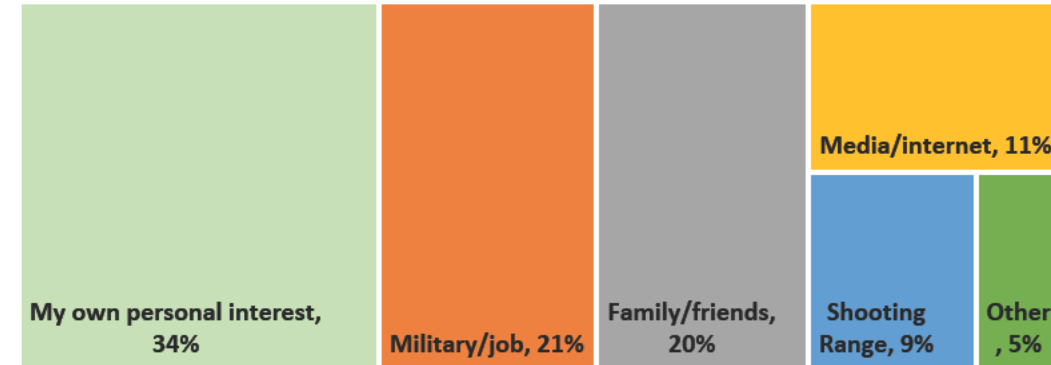
- One-third of MSR owners became interested through their own personal accord.
- About 21% first gained interest through the military or their job, and another 20% through family/friends.

Modern Sporting Rifle Ownership: Experience

Introduction to MSRs: where did you first gain interest?



Introduction to MSRs (Grouped)

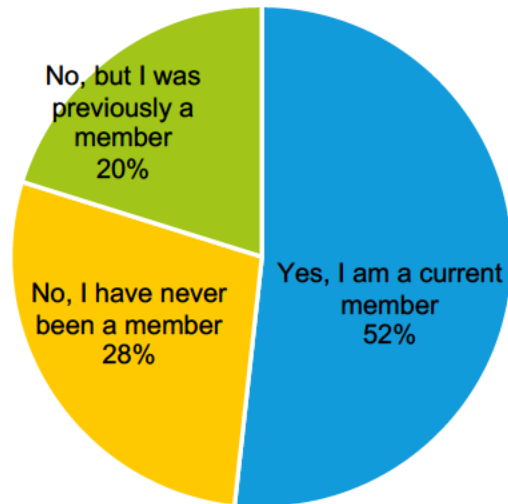


- One-third of MSR owners became interested through their own personal accord.
- About 21% first gained interest through the military or their job, and another 20% through family/friends.

NSSF MSR Consumer Study - Report of Findings

Modern Sporting Rifle Ownership: Shooting Ranges

Do you currently have a membership at a shooting range?



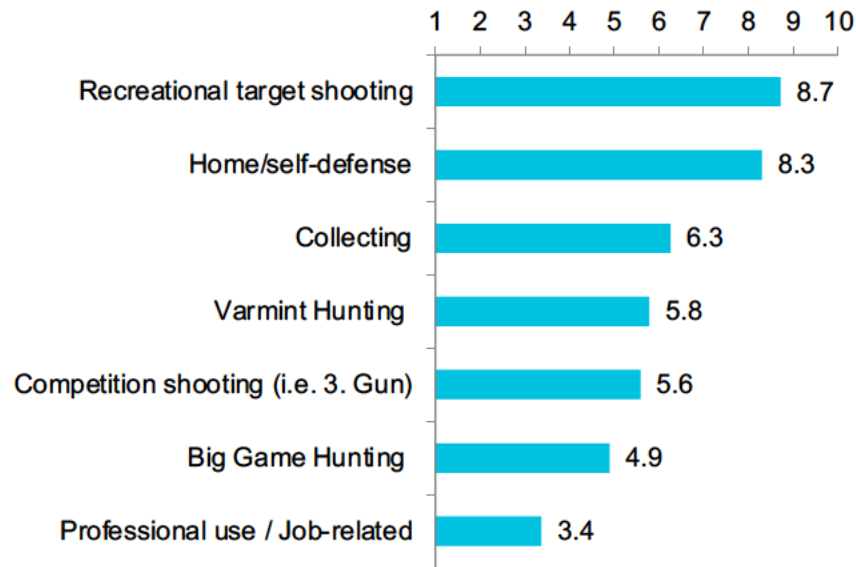
- About half of MSR owners are current members of a shooting range.
- 28% have never been a member of a shooting range.

NSSF MSR Consumer Study – Report of Findings

Modern Sporting Rifle Ownership: Reasons for Ownership

Respondents were asked to rate how important each of the following reasons are to owning an MSR. They rated each reason on a scale from 1 to 10, where 1 is “not at all important” and 10 is “very important.”

Rating: How important are these reasons to owning an MSR?



Scale:

1=Not at all important, 10= very important

- Recreational target shooting was rated as the most important reason for owning an MSR.
- Big game hunting and professional/job-related use were given the lowest importance ratings.

	MSR Owned					Age			Usage Frequency			
	1	2	3	4	5+	Under 45	45 to 54	55+	3 times or less	4 to 11 times	12 to 23 times	24+ times
Recreational target shooting	8.4	8.7	8.8	8.6	9	8.4	8.8	8.9	8.5	8.8	9	9.1
Home/self-defense	7.9	8.2	8.2	8.3	8.7	8.4	8.3	8.2	8	8.3	8.5	8.7
Collecting	5.2	5.8	6.6	6.7	7.1	6.9	6.5	5.8	5.9	6.2	6.4	7
Varmint Hunting	5.2	5.5	5.8	5.9	6.3	5.7	5.8	5.8	5.2	5.7	6.2	7
Competition shooting (i.e. 3. Gun)	4.6	5.3	5.6	6	6.4	6	5.8	5.2	4.9	5.4	6.3	7
Big Game Hunting	4.3	4.4	4.9	5.4	5.5	5.2	4.9	4.7	4.4	4.9	5.2	6
Professional use / Job-related	2.8	3	3.7	3.5	3.9	4	3.4	3	3	3.2	3.6	4.5

NSSF MSR Consumer Study - Report of Findings



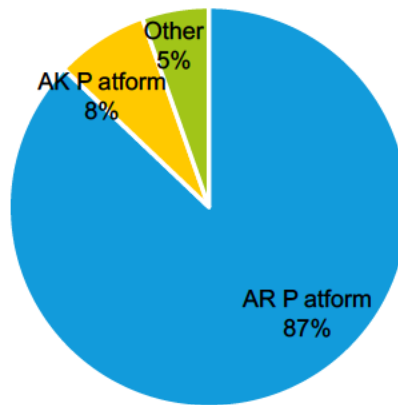
Section 2: Most Recently Acquired Modern Sporting Rifle



NSSF MSR Consumer Study – Report of Findings

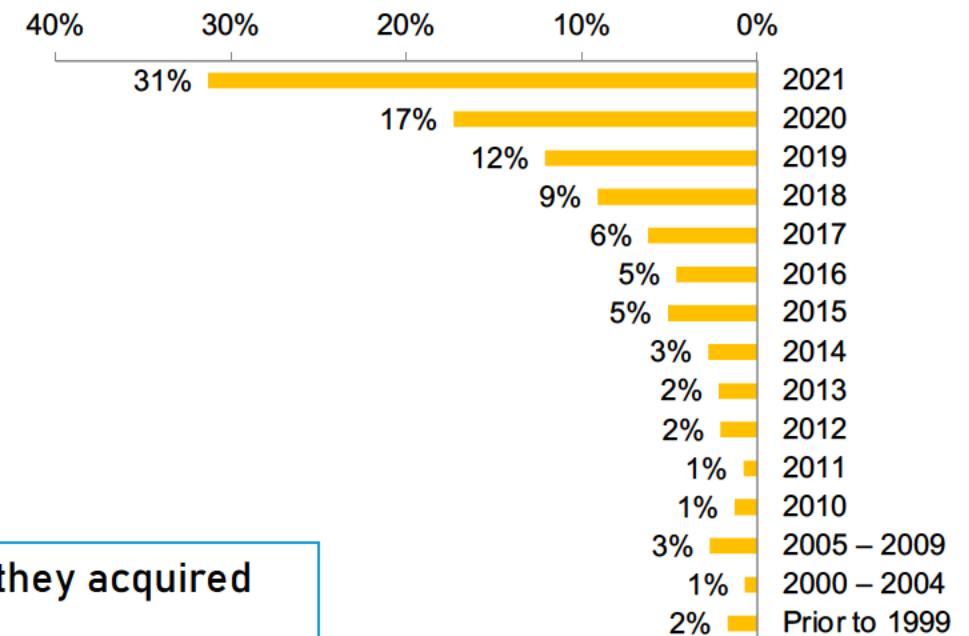
Most Recently Acquired MSR: Platform, When Acquired

Platform - Most Recent MSR Obtained



- Nearly 9 out of 10 MSR owners said the most recent MSR they acquired was an AR platform.
- Nearly one-third of MSR owners said they acquired their most recent one in 2021, nearly 50% within the last two years (2021 or 2020).

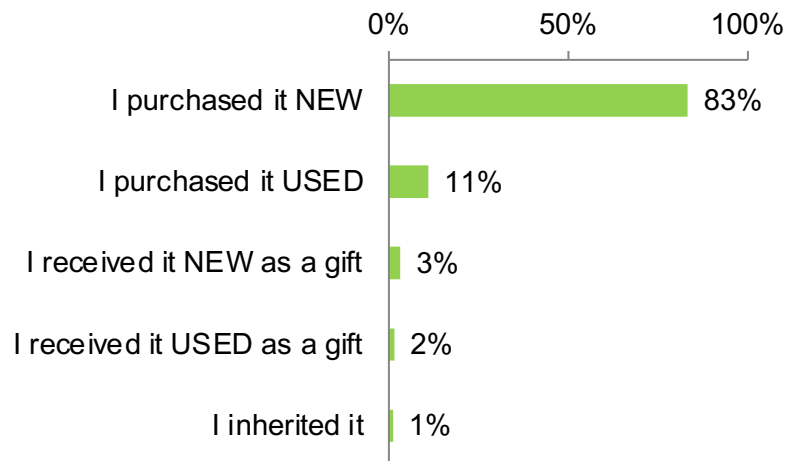
Year of Most Recently Acquired MSR



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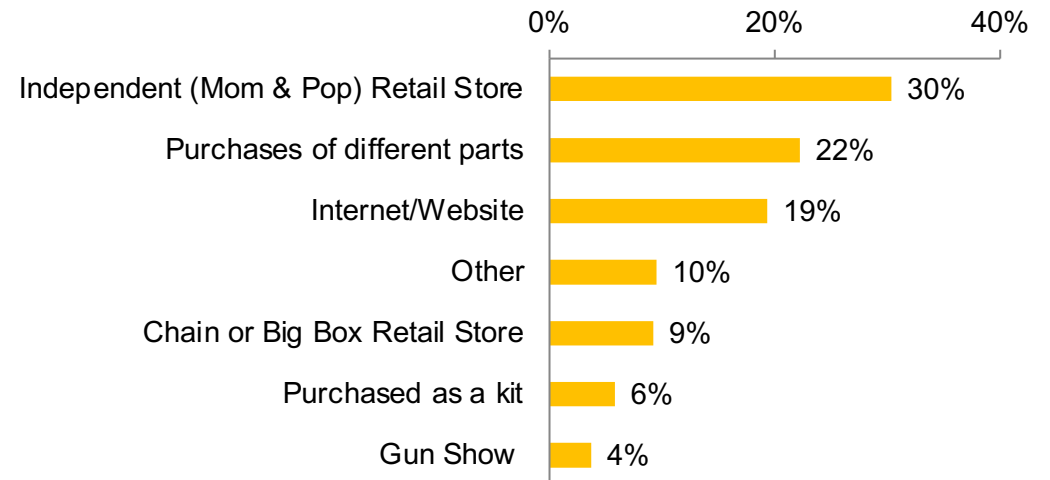
Most Recently Acquired MSR: How? Where?

How did you obtain your most recently acquired MSR?



- 83% of MSR owners acquired their most recent MSR by purchasing it new.

Place of Purchase



- For those purchasing a new or used MSR, the most common place of purchase was an independent retail store.
- Popular retailers & online sites used: Palmetto State Armory, Gunbroker.com, Cabela's, Sportsman's Warehouse,

NSSF MSR Consumer Study – Report of Findings

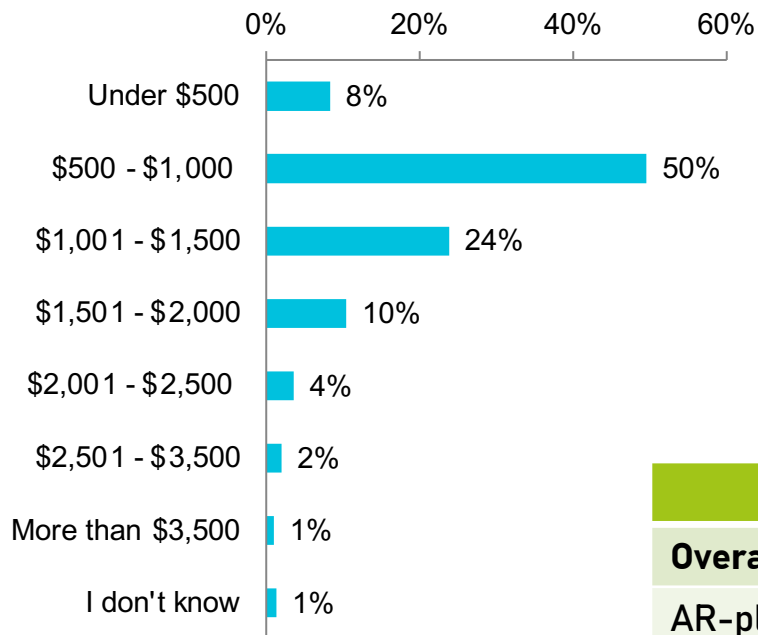
Most Recently Acquired MSR: Place of Purchase

	Total	Number of MSRs Owned					Age			Range Membership	
		1	2	3	4	5+	Under 45	45 to 54	55+	Member	Non-member
Independent (Mom & Pop) Retail Store	30.3%	31.9%	30.5%	31.1%	29.8%	28.9%	26.6%	35.1%	30.1%	33.9%	26.5%
Purchases of different parts	22.2%	12.0%	18.8%	24.8%	29.3%	28.6%	25.4%	25.8%	19.0%	21.3%	23.2%
Internet/Website	19.3%	18.6%	21.1%	16.2%	19.1%	20.2%	24.3%	14.1%	19.1%	18.1%	20.7%
Other	9.5%	11.4%	11.2%	9.6%	8.0%	7.3%	6.1%	7.8%	11.9%	8.9%	10.1%
Chain or Big Box Retail Store	9.2%	16.2%	10.1%	7.6%	5.3%	5.2%	7.9%	8.8%	9.9%	7.9%	10.5%
Purchased as a kit	5.8%	5.6%	4.6%	6.3%	5.8%	6.4%	7.0%	4.6%	5.6%	5.9%	5.6%
Gun Show	3.7%	4.2%	3.7%	4.3%	2.7%	3.5%	2.7%	3.8%	4.2%	4.0%	3.4%

NSSF MSR Consumer Study – Report of Findings

Most Recently Acquired MSR: Price

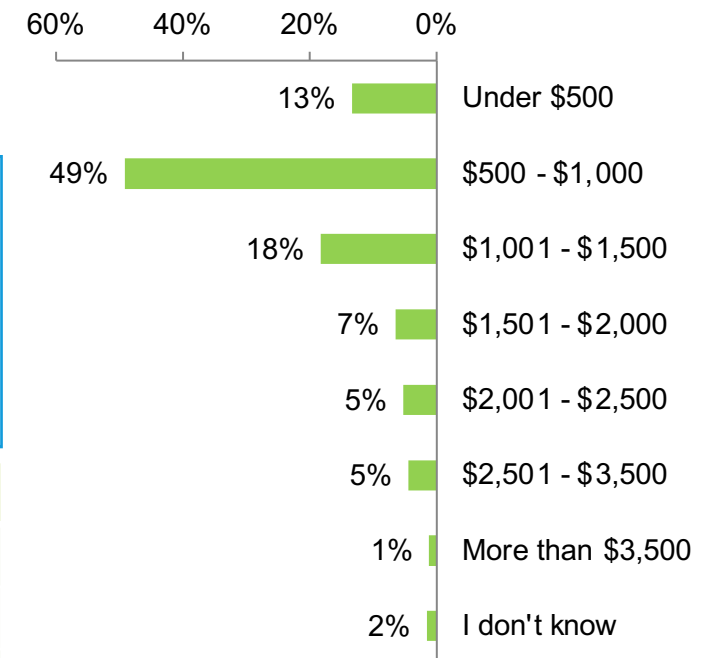
Price of most recently acquired NEW MSR



- Half of MSR owners paid between \$500 and \$1000 for their most recently purchased MSR, both those who bought a new MSR and those who bought a used MSR.
- Average price for last MSR: \$1,071.

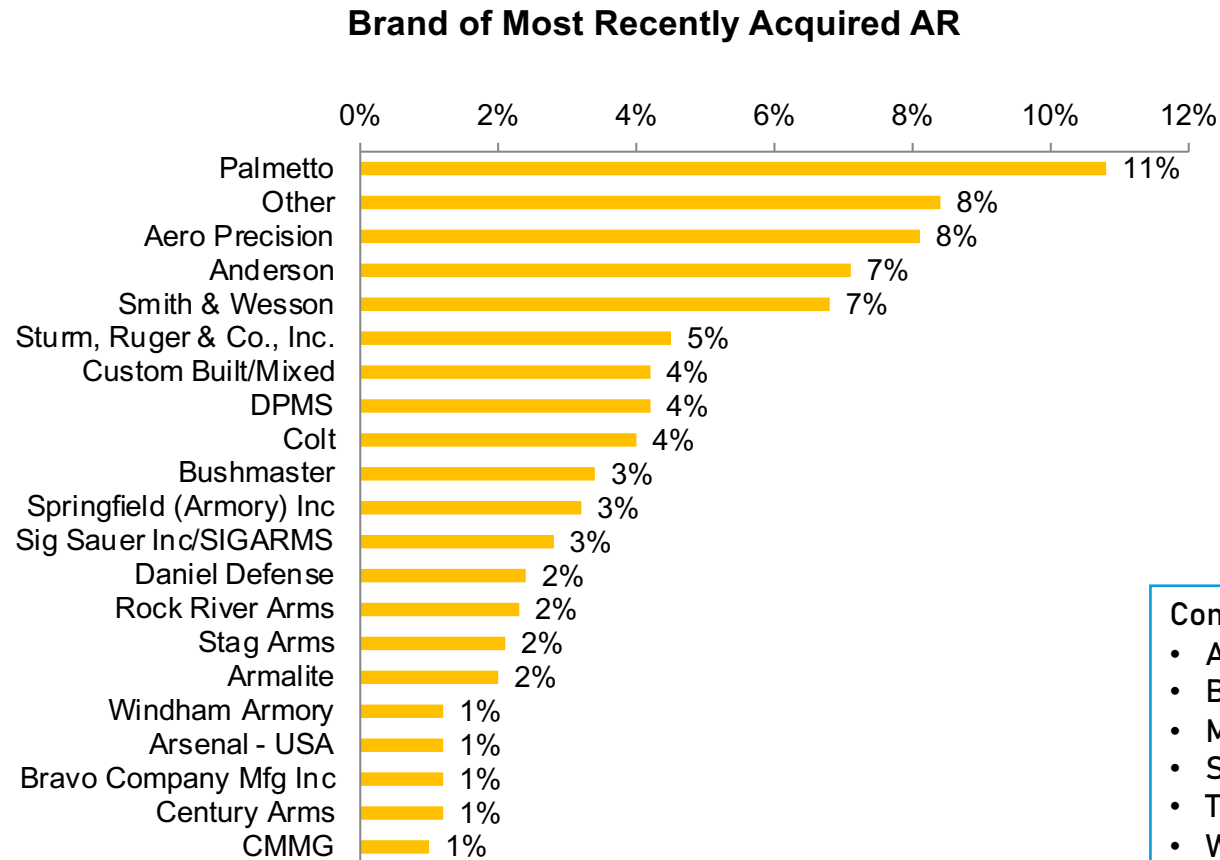
	2010	2013	2021
Overall average	\$1,083	\$1,058	\$1,071
AR-platform (new)		\$1,112	\$1,057
AR platform (used)			\$992
AK platform (new)		\$711	\$1,086
AK platform (used)			\$1,218

Price of most recently acquired USED MSR



NSSF MSR Consumer Study – Report of Findings

Most Recently Acquired MSR: Brand



- Survey data indicates the MSR market is highly fragmented. 11% of MSR owners said Palmetto was the brand of their most recently acquired MSR — the highest among the options available.

Commonly mentioned brands included in “Other”:

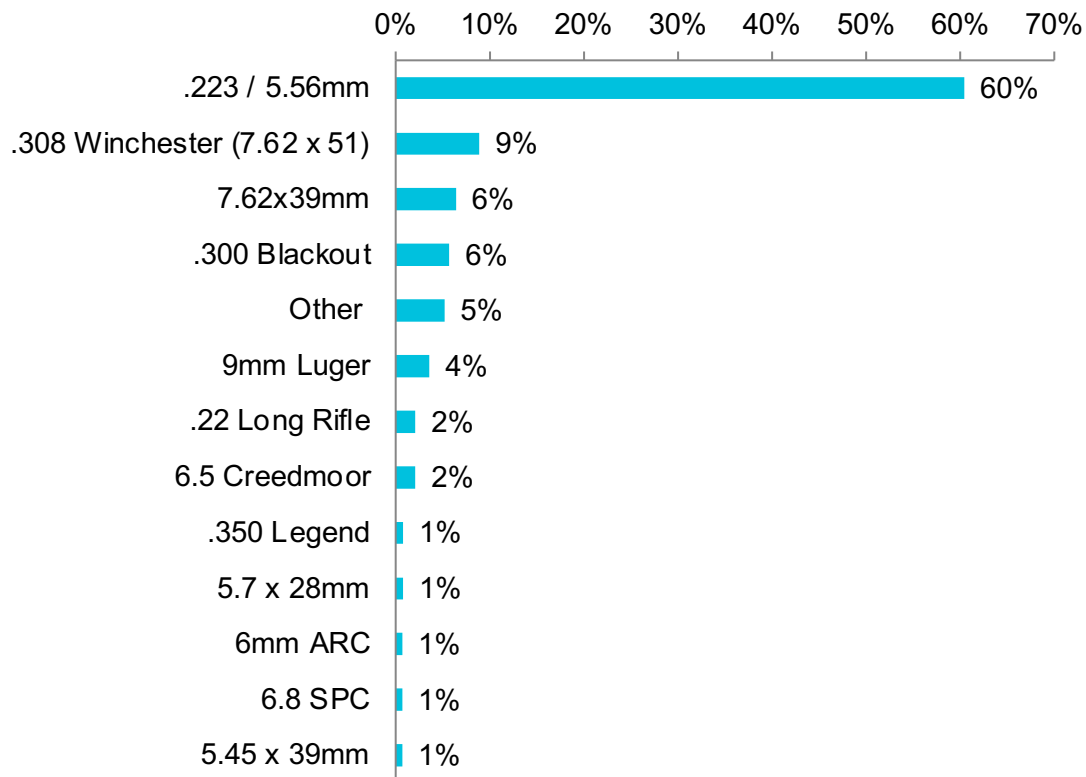
- ATI
- Battle Arms Development
- MBX
- Sharp Bros
- Tavor
- WBP

50+ other brands were selected by less than 1 % of respondents; full list available upon request

NSSF MSR Consumer Study – Report of Findings

Most Recently Acquired MSR: Caliber

Caliber of Most Recently Acquired MSR



7 other calibers were selected by less than 1 % of respondents

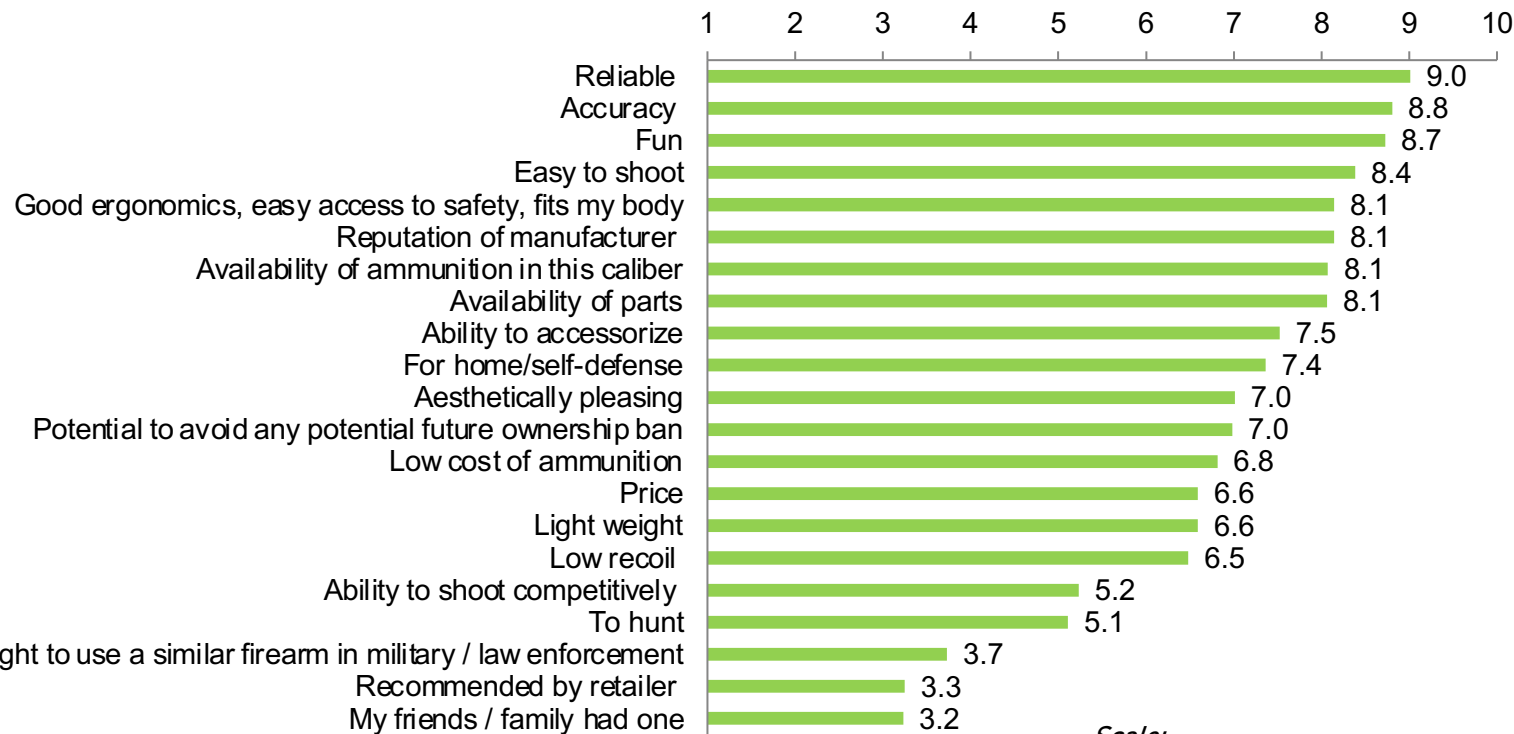
- 60% of respondents said the caliber of their most recently acquired MSR is .223 / 5.56 mm
- Of the 5% selecting “other,” the most frequently mentioned calibers included:
 - 6.5 Grendel
 - .458 SOCOM
 - .224 Valkyrie

NSSF MSR Consumer Study – Report of Findings

Most Recently Acquired MSR: Reasons for Buying

For the 94% of respondents that purchased their MSR new or used, they were asked to rate how important each of the following reasons are for selecting their most recently acquired MSR on a scale from 1 to 10, where 1 is “not at all important” and 10 is “very important.”

Rating: Most Important Reasons for Buying Most Recently Purchased MSR



Scale:

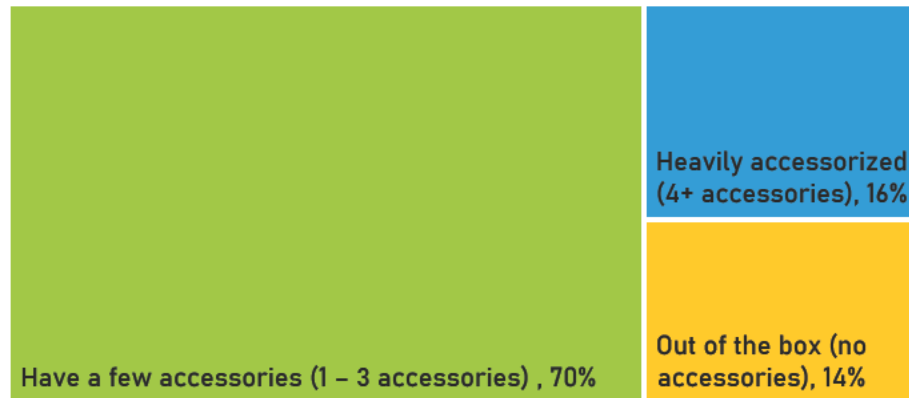
1=Not at all important, 10= very important

- MSR owners rated reliability, accuracy, and fun as the most important reasons for purchasing their most recently acquired MSR.
- The least important reasons as rated by MSR owners include recommendations from a retailer and MSRs owned by family/friends.

NSSF MSR Consumer Study – Report of Findings

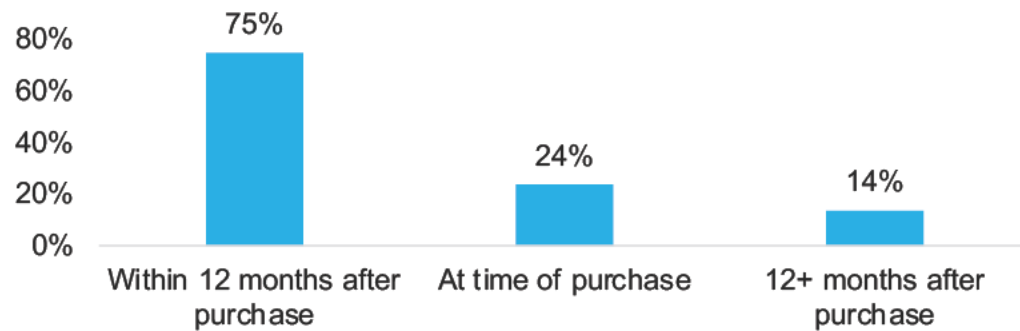
Most Recently Acquired MSR: Accessories

MSR - Use of Accessories



- 86% of have their most recently acquired MSR customized to some extent, 70% having 1-3 accessories.
- For those with accessories on their most recently acquired MSR, 75% added accessories within 12 months after purchase. Nearly a quarter added accessories at the time of purchase.

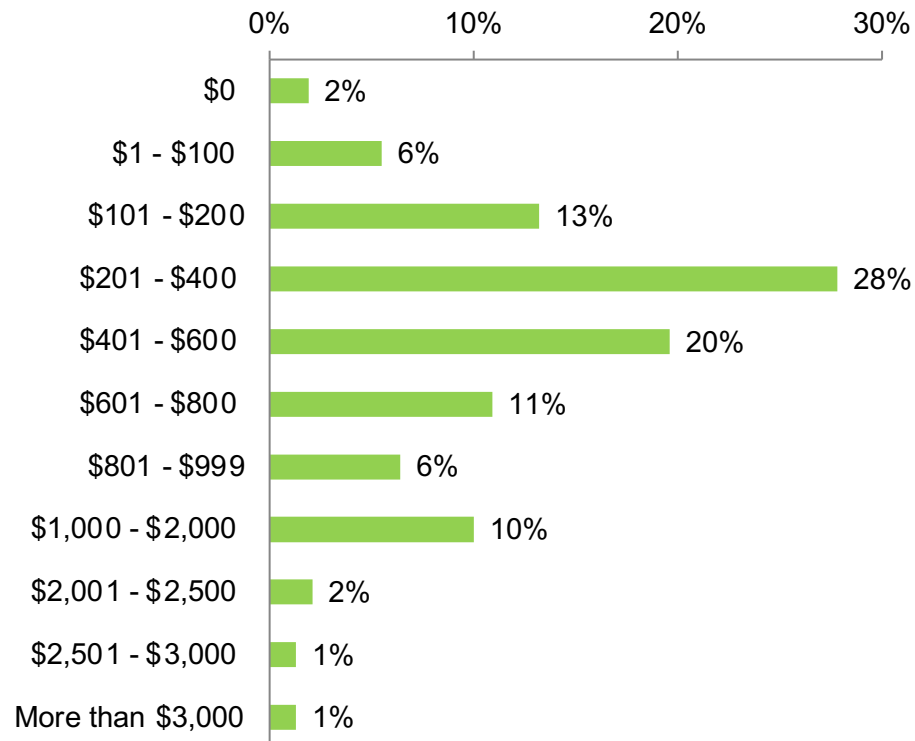
When have you added accessories to your MSR?



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Most Recently Acquired MSR: Accessories - Spend

Spend on After-Market Customization to Most Recently Acquired MSR



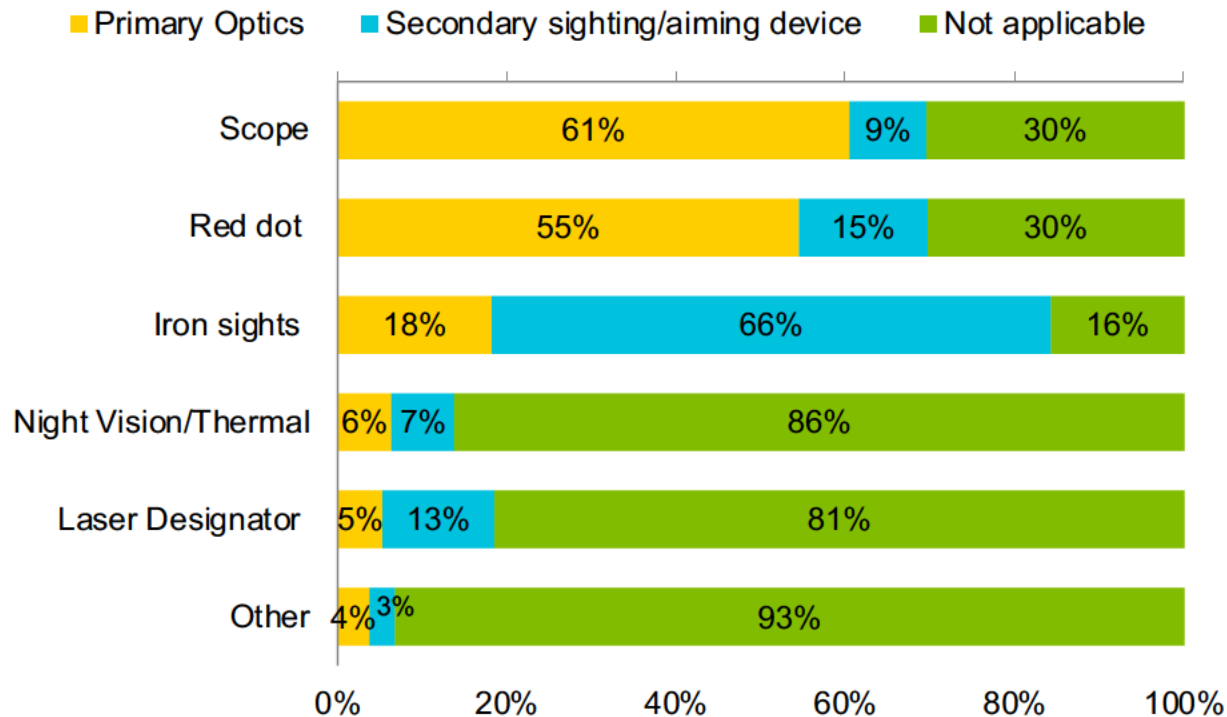
	2010	2013	2021
Average spent	\$436	\$381	\$618

- Of the MSR owners who have added accessories to their most recently acquired MSR, nearly half, or 48%, have spent between \$201 and \$600 on after-market customization.
- The average spent for accessories by owners on their most recently acquired MSR by owners is \$618.

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Most Recently Acquired MSR: Optics

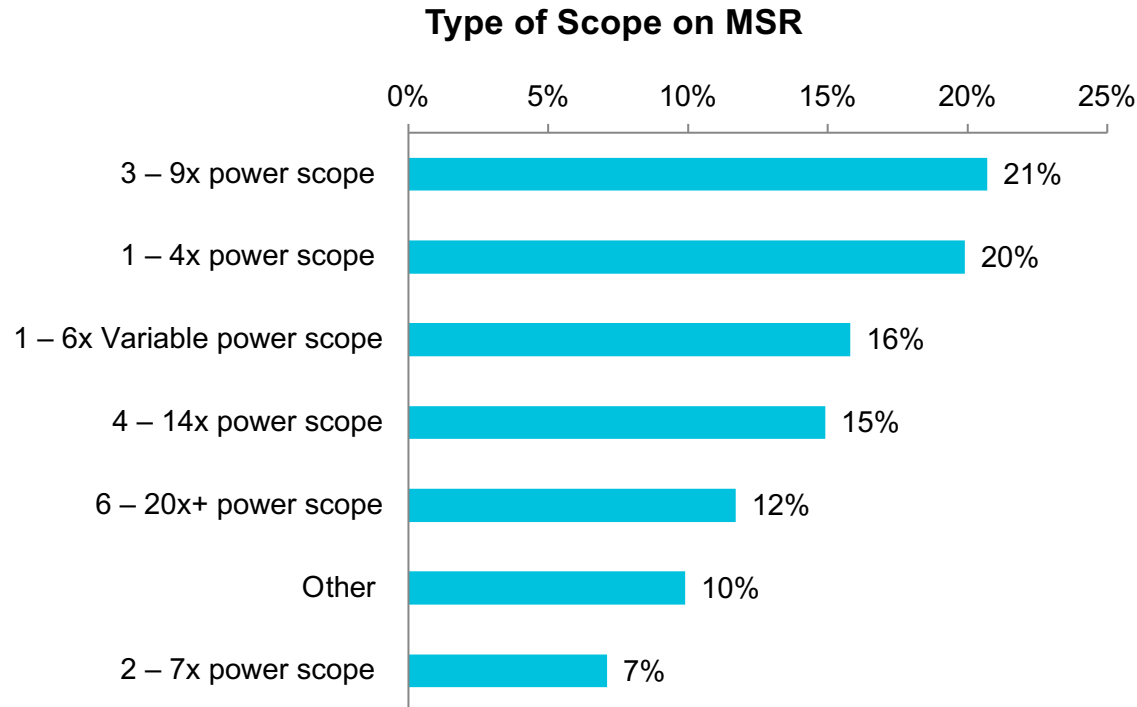
Optics Used on Most Recently Acquired MSR



- 61% of MSR owners have a scope equipped as a primary optic on their most recently acquired MSR.
- Iron sights are the most common secondary aiming device, equipped on two-thirds of respondents' MSRs.

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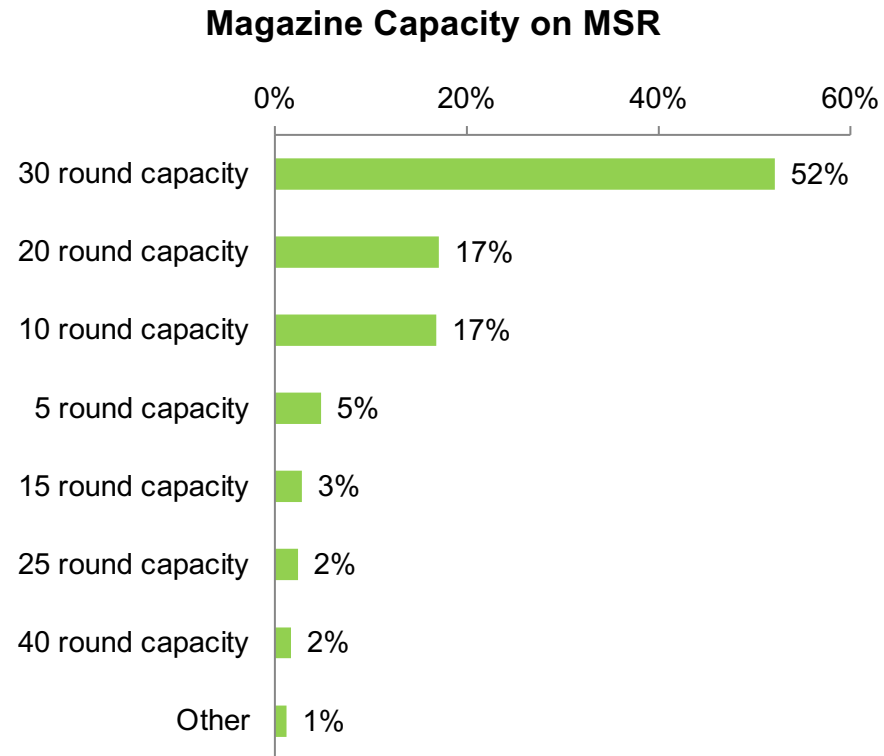
Most Recently Acquired MSR: Scope



- The most common scopes used by MSR owners are the 3-9x power scope (21%) and the 1-4x power scope (20%).
- Of the 10% who selected “Other,” the most frequently mentioned scopes were:
 - 1-8x variable power scope
 - 1-10x variable power scope

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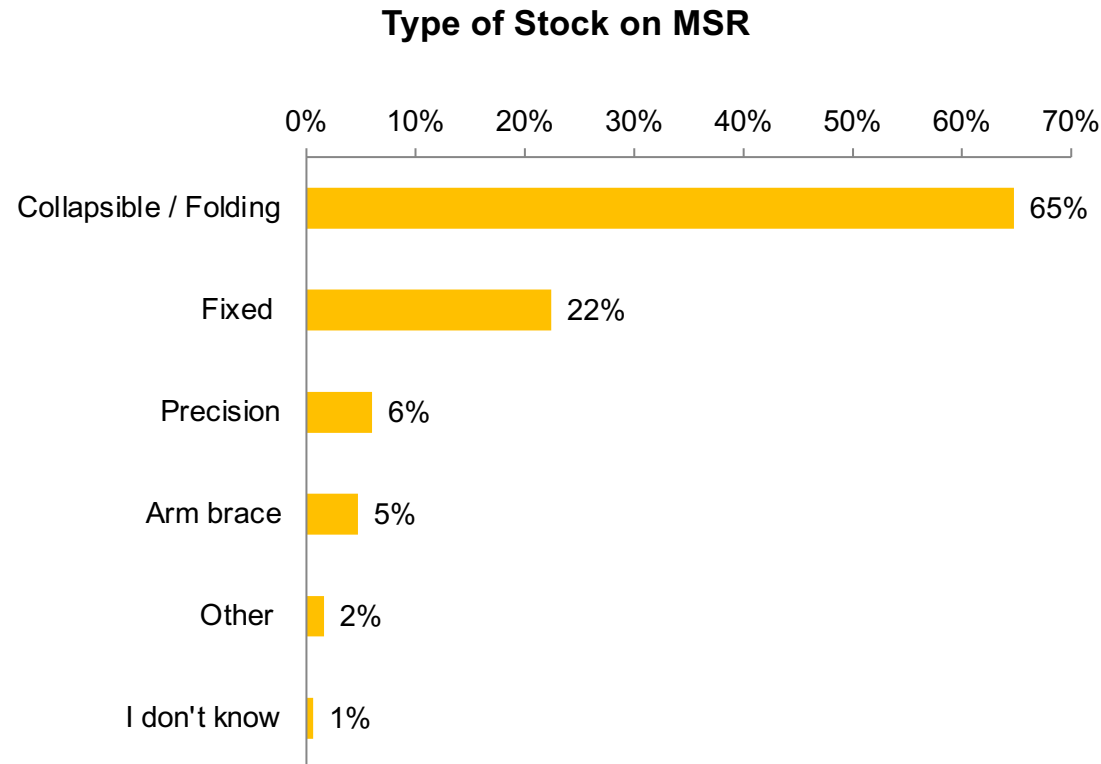
Most Recently Acquired MSR: Magazine Capacity



- Half (52%) of MSR owners stated the magazine capacity of their most recently acquired MSR is 30 rounds.
- When asked why they chose their respective magazine capacity, the most frequent responses were:
 - Common/standard
 - Readily available

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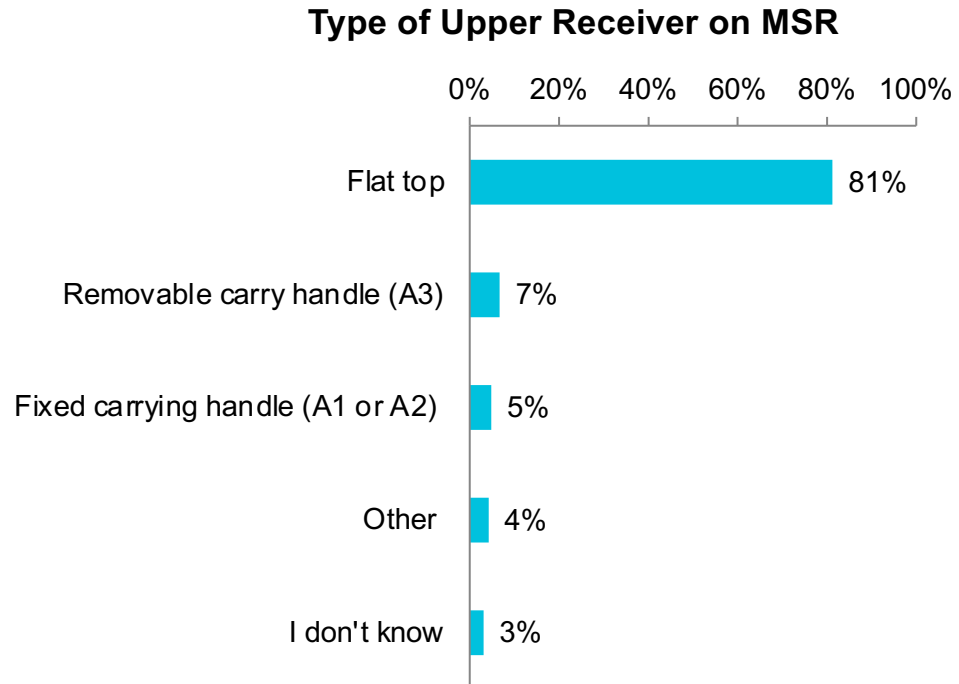
Most Recently Acquired MSR: Type of Stock



- 65%, or approximately two-thirds, of MSR owners have a collapsible/folding stock on their most recently purchased MSR.

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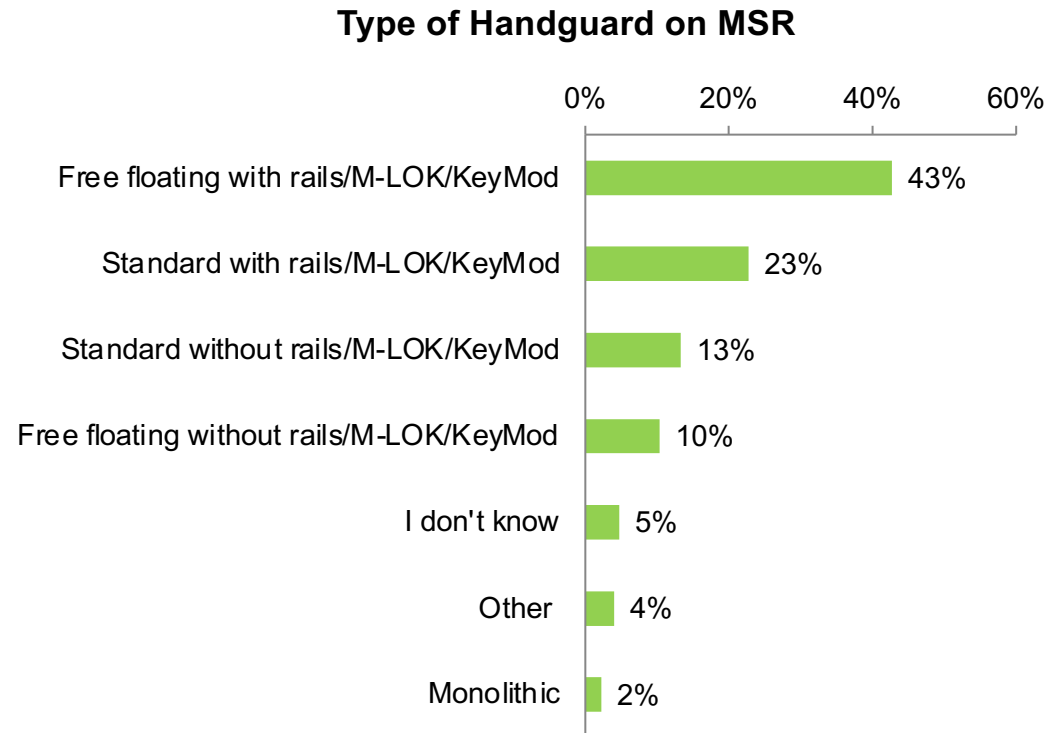
Most Recently Acquired MSR: Type of Upper Receiver



- 81% have a flat top upper receiver on their most recently acquired MSR.

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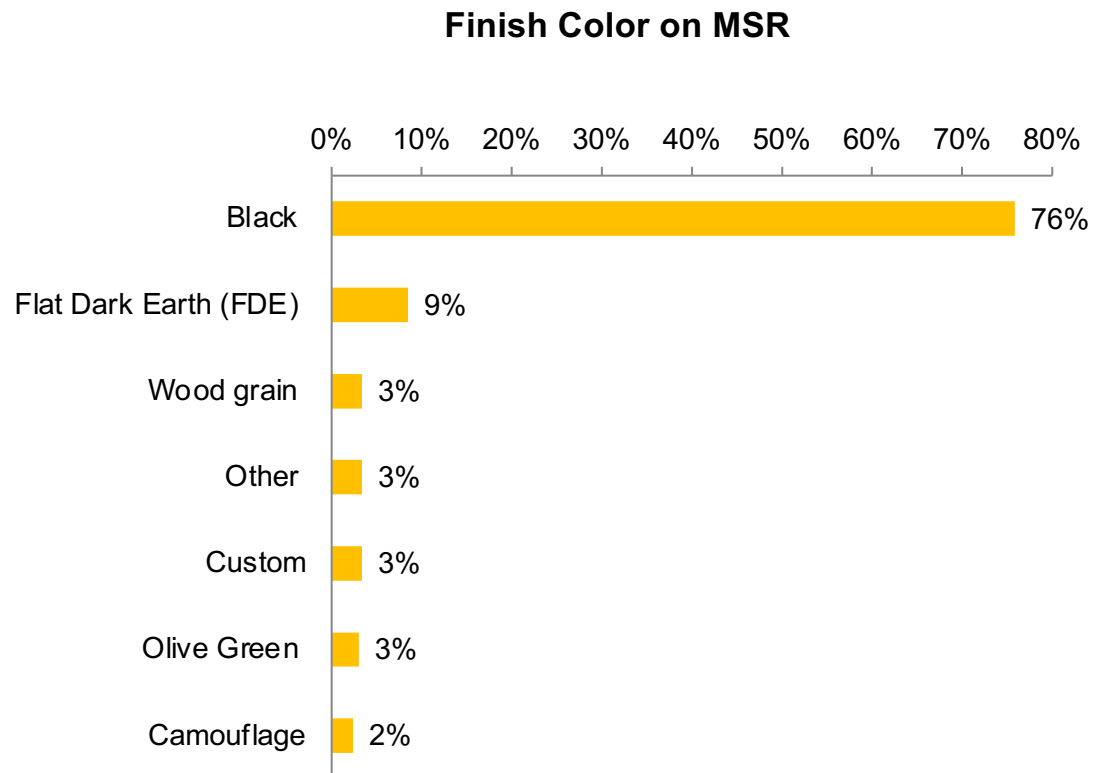
Most Recently Acquired MSR: Type of Handguard



- The most common type of handguard is a free floating with rails handguard, used by 43% of respondents on their most recently acquired MSR.

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Most Recently Acquired MSR: Finish Color

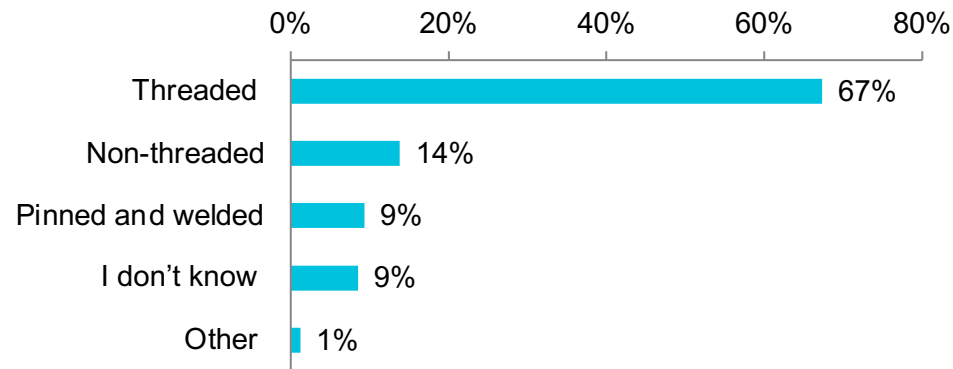


- 3 out of 4 MSR owners have a black finish color.

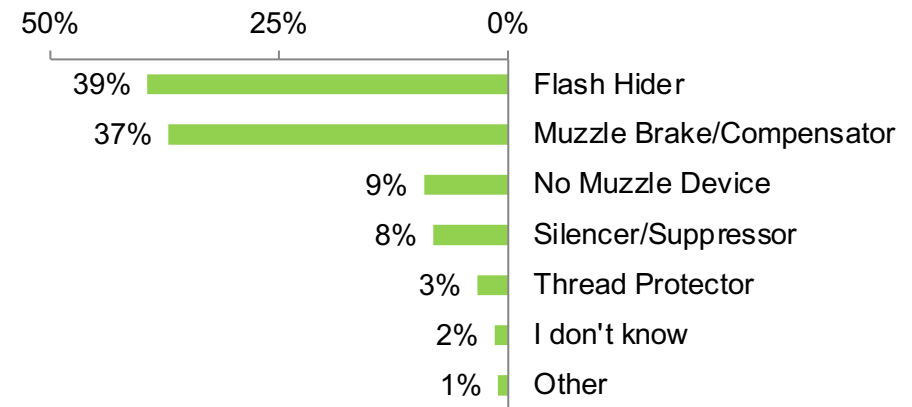
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Most Recently Acquired MSR: Barrels – Type, Accessories, Length

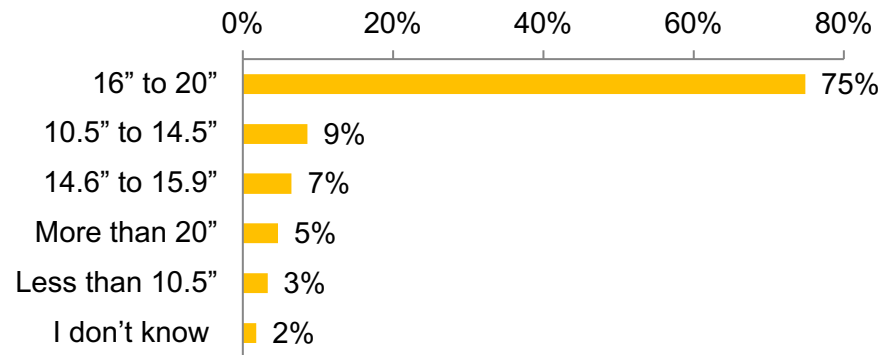
Type of Barrel on MSR



Barrel Accessories on MSR



Barrel Length on MSR

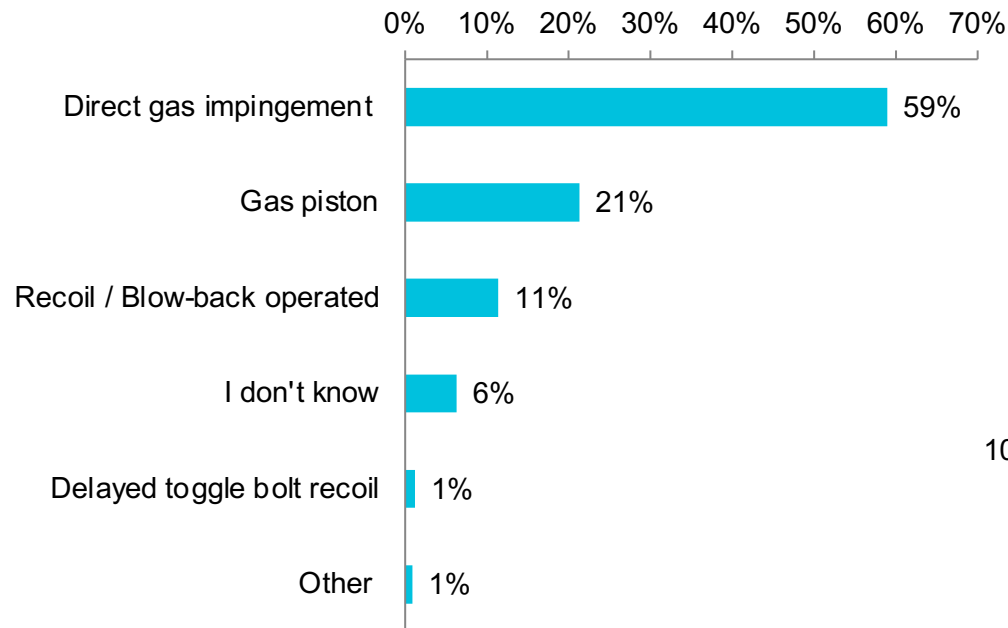


- Two-thirds of MSR owners have a threaded barrel.
- Most common accessories: flash hider (39%), muzzle brake/compensator (37%)
- 75% have a barrel length of 16-20"

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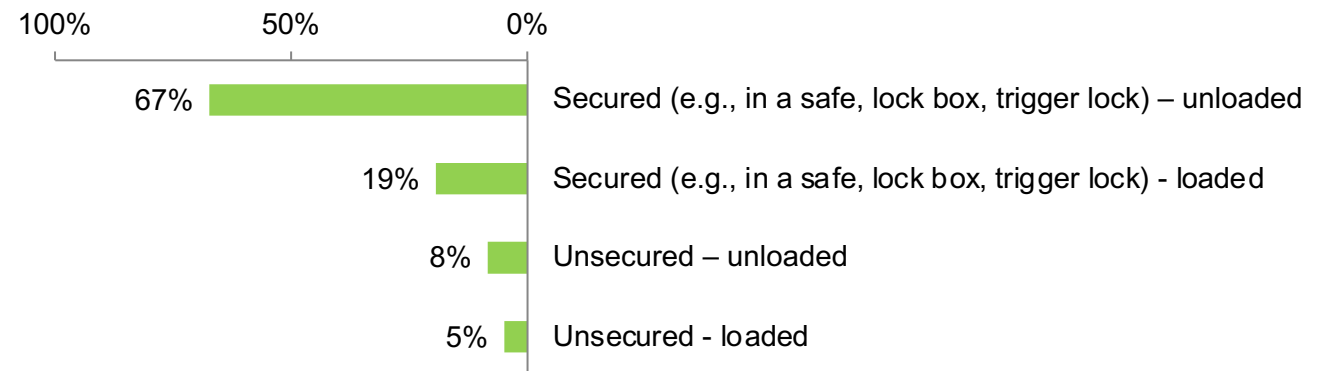
Most Recently Acquired MSR: Operating System, Storage

Operating System on MSR



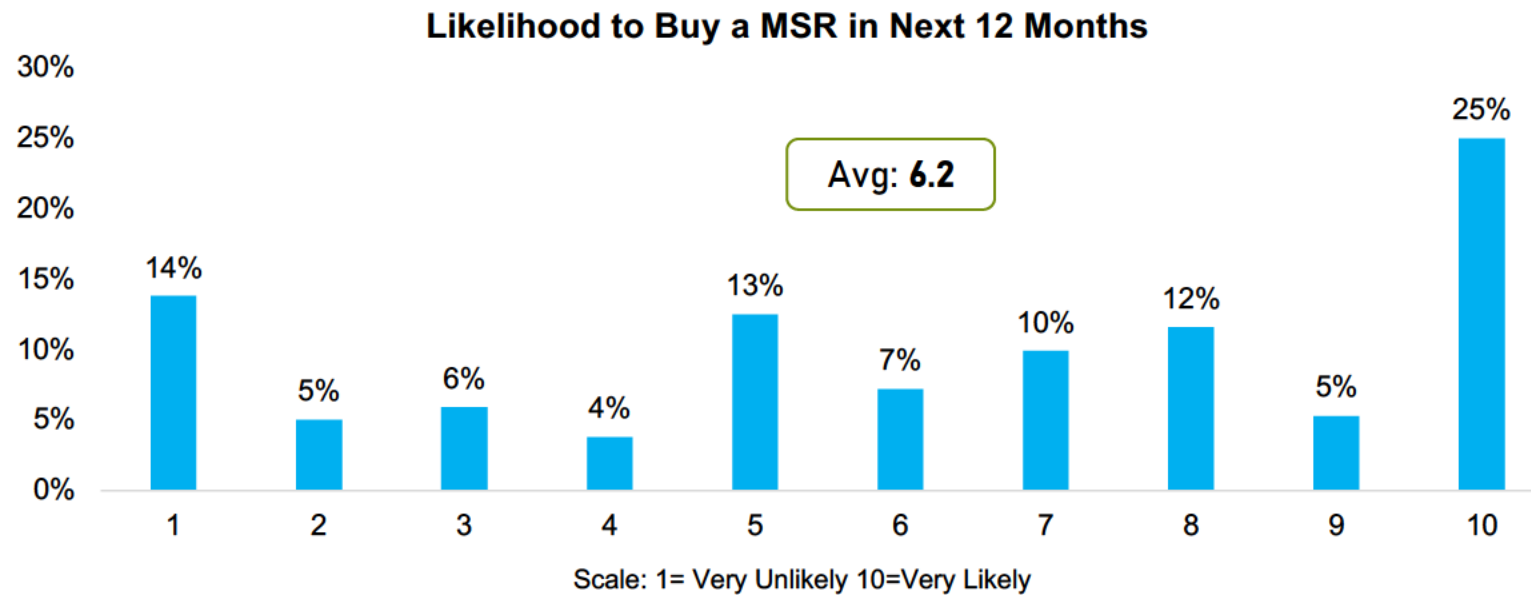
- 59% of MSR owners indicated their most recently acquired MSR is operated by direct gas impingement.
- 67%, or two-thirds, of MSR owners store their MSR secured and unloaded.

MSR Storage



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Most Recently Acquired MSR: Likelihood to Buy a MSR in Next 12 Months



- Average likelihood to buy an MSR in the next 12 months is a 6.2 out of 10, slightly more to the “likely” end of the scale.
- 25%, or one-fourth of respondents, said they are “very likely” to buy an MSR in the next 12 months.

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Most Recently Acquired MSR: Accessories Owned

	Owned	Plan to buy in next 12 months	Don't own, don't plan to buy
Gun Cleaning Kit	94%	9%	3%
Extra Magazines	87%	23%	6%
Targets	84%	26%	5%
Soft Carrying Case	84%	9%	12%
Rifle Sling	81%	21%	8%
Gun Safe	78%	14%	13%
Rifle Scope	76%	23%	14%
Hard Carrying Case	69%	12%	25%
Gun Lock	64%	4%	32%
Backup sights	55%	20%	31%
Bipod	55%	21%	34%
Railed Handguard	54%	13%	36%
Spotting Scope	52%	19%	31%
Mounted Flashlight	46%	27%	36%
Trigger Upgrade	45%	26%	39%
Range Finder	43%	25%	37%
Vertical Fore-grip	41%	14%	49%
Stock Upgrade	37%	17%	49%
Suppressor/silencer	19%	37%	53%
Laser Designator	17%	12%	72%
Night Vision/Thermal	13%	26%	67%
Other	6%	4%	43%

- The most common accessories currently owned by MSR owners are gun cleaning kits, extra magazines, targets, and soft carrying case.
- The accessory that MSR owners most frequently said they planned to buy in the next 12 months is a suppressor/silencer.
- Roughly 70% of MSR owners do not own and do not plan to buy a laser designator or night vision/thermal scope in the next 12 months.

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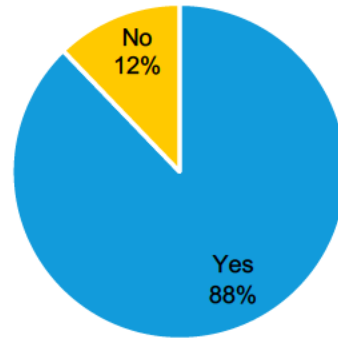
Section 3: Modern Sporting Rifle Usage & Activities



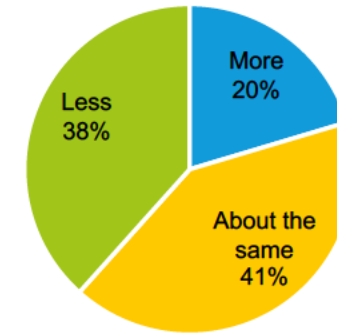
NSSF MSR Consumer Study - Report of Findings

MSR Usage and Activities

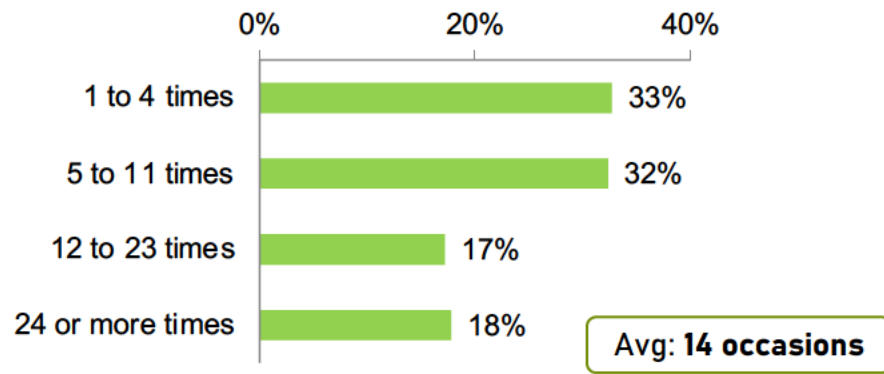
Used Your MSR(s) in the last 12 months?



MSR Use in Last 12 Months Compared to Previous 12 Months



MSR Usage: Number of Times in Last 12 Months

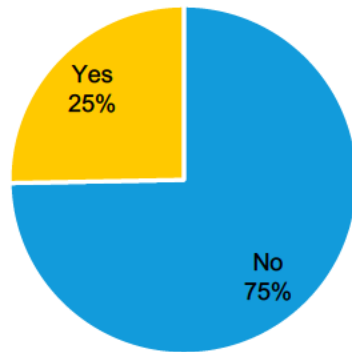


- 88% of MSR owners used/shot their MSR(s) in the last 12 months. Compared to the 12 months before that, 41% said their MSR use was “about the same.” 38% said it was less.
- Of those who used their MSR, the average number of times respondents used it in the last 12 months is 14.

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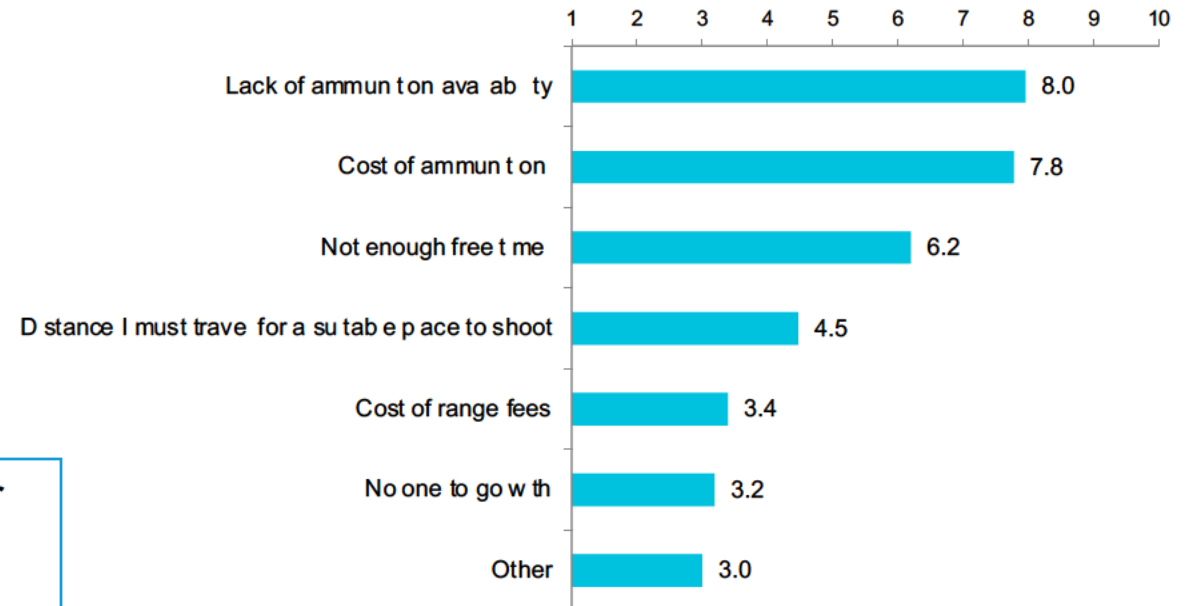
MSR Usage and Activities: Factors Preventing Usage

Used MSR As Much As You Would Like in Last 12 Months?



- 3 out of 4 MSR owners said they did not use their MSR as much as they would like over the past 12 months.
- The most important factors preventing owners from using their MSR more are related to ammunition: lack of availability and cost.

Rating: How important are the following in preventing you from using your MSR as much as you'd like?

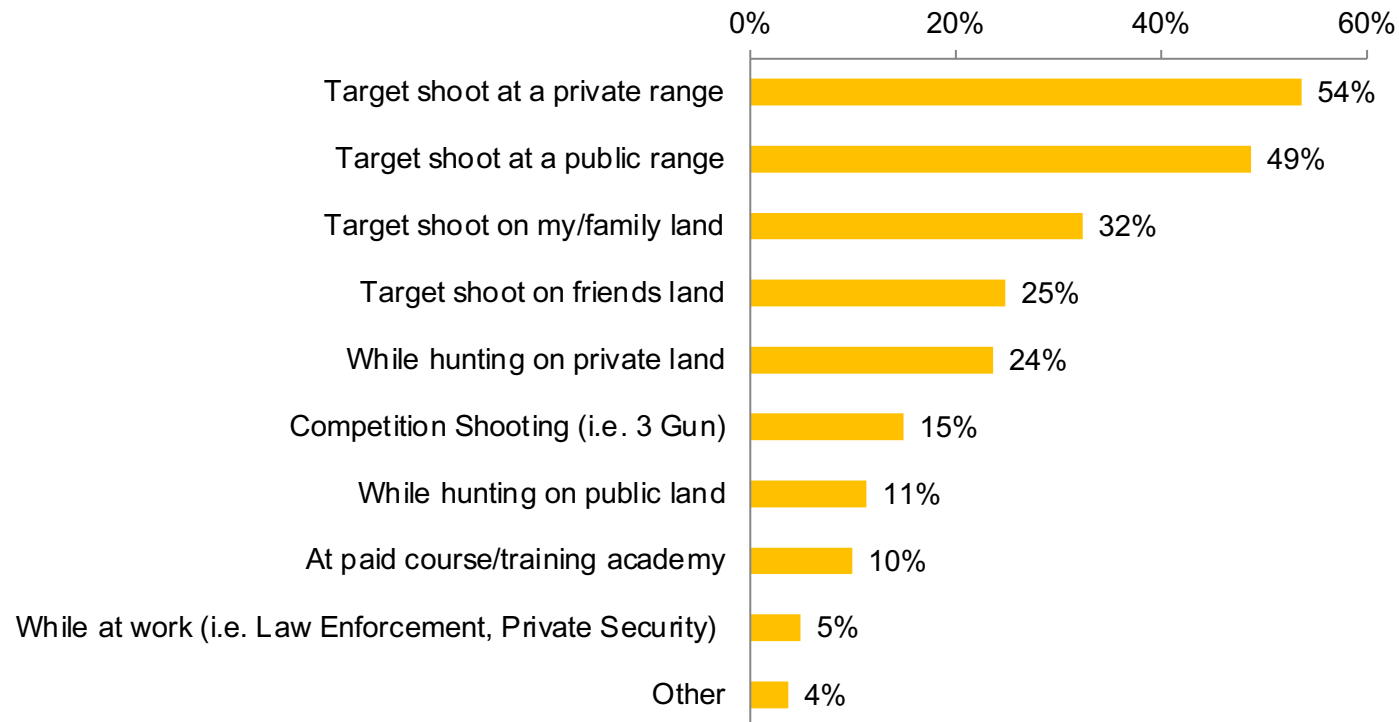


Scale:
1=Not at all important, 10= very important

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MSR Usage and Activities

MSR Activities in Last 12 Months

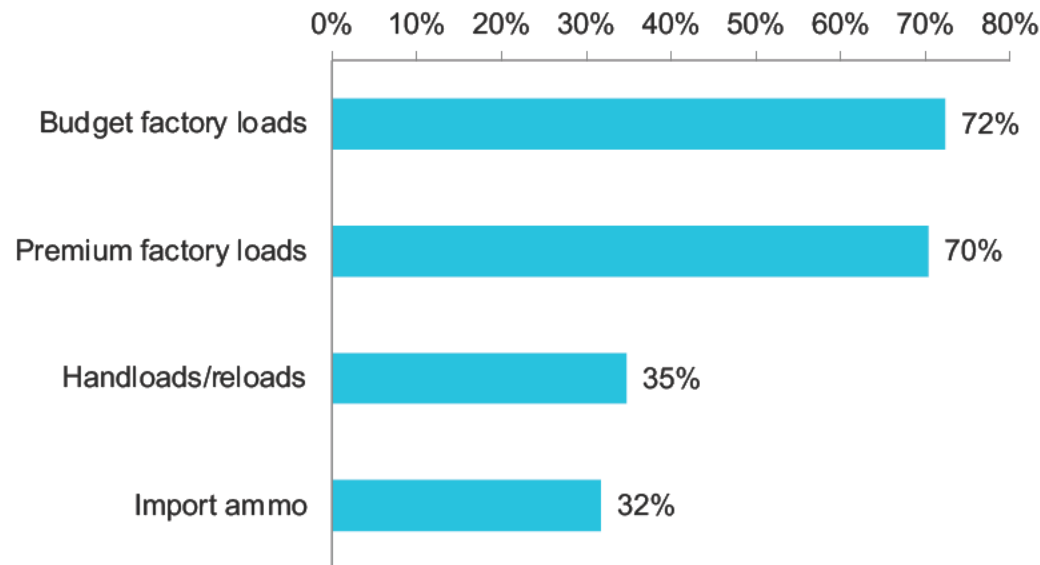


- The most popular activity by MSR owners is target shooting; 54% said they did at a private range, while 49% said they did at a public range.

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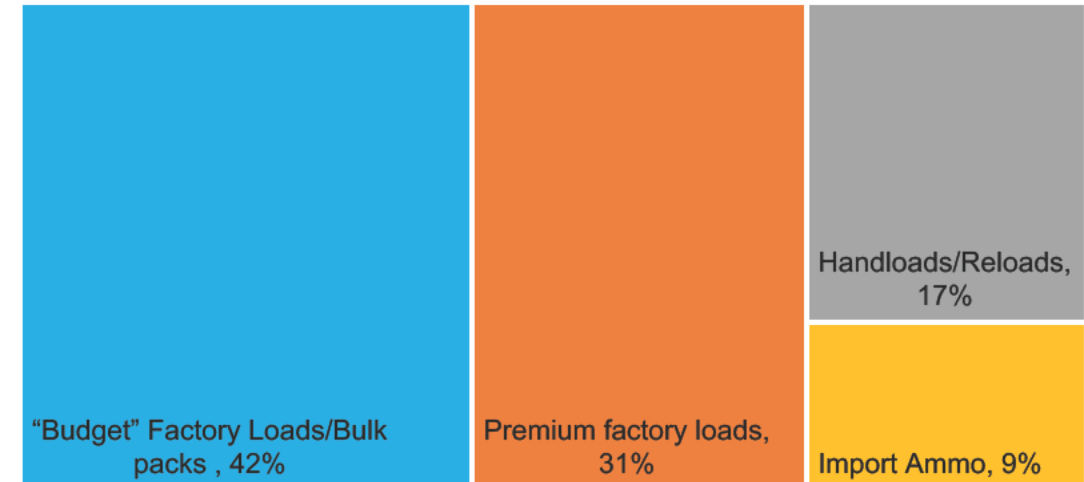
MSR Usage and Activities: Ammunition Used - Type

Ammo Used (% of MSR Owners Using)



- Across all MSR owners, roughly 70% of used budget factory loads and premium factory loads in the last 12 months.

Ammo Profile - Average % Breakdown Per MSR Owner

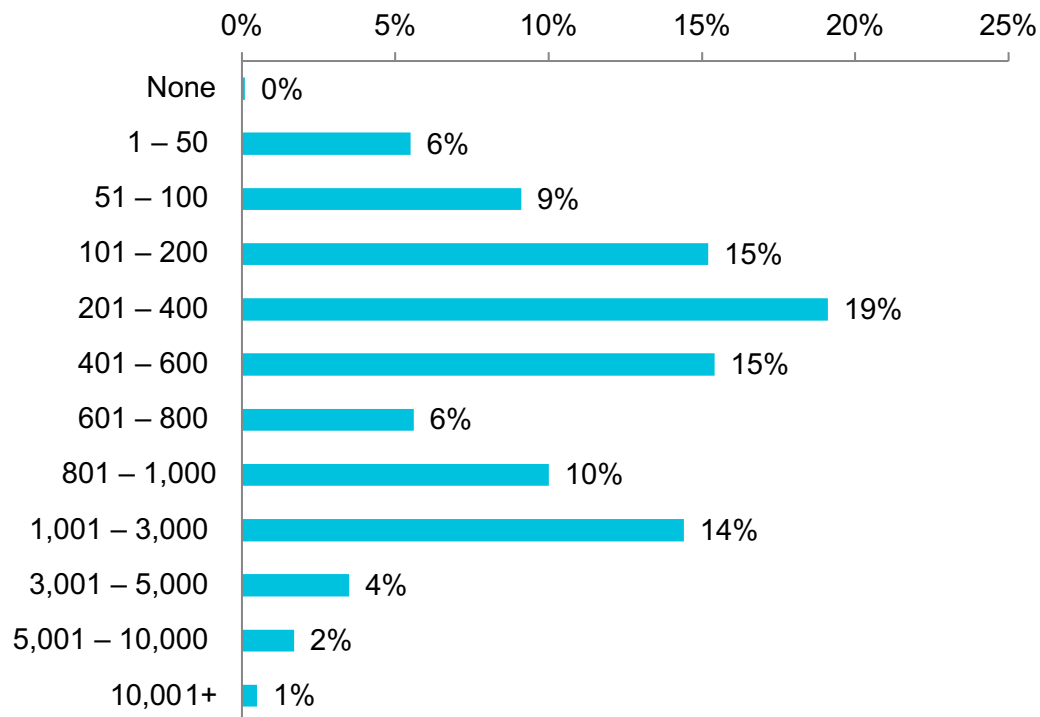


- The ammo breakdown per MSR owner shows that 42% of ammo they used in the past 12 months are factory loads/bulk packs.

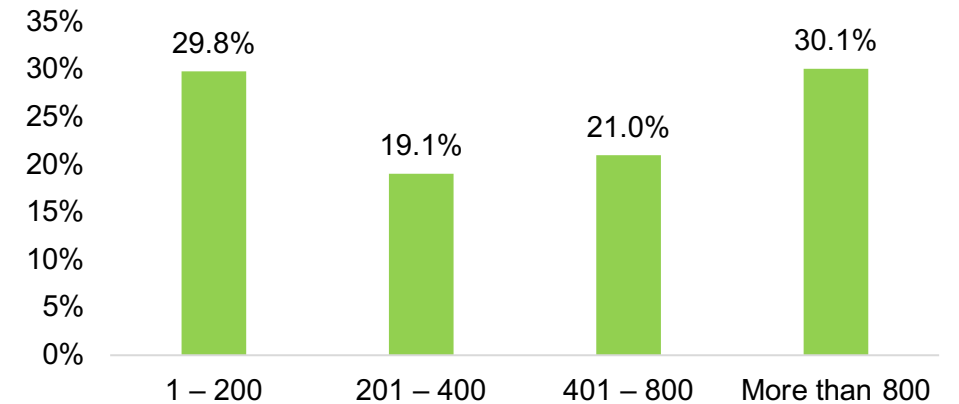
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MSR Usage and Activities: Ammunition Used - Amount

Rounds of Ammo Fired Through MSR In Last 12 Months



Rounds of Ammo Fired (Grouped)

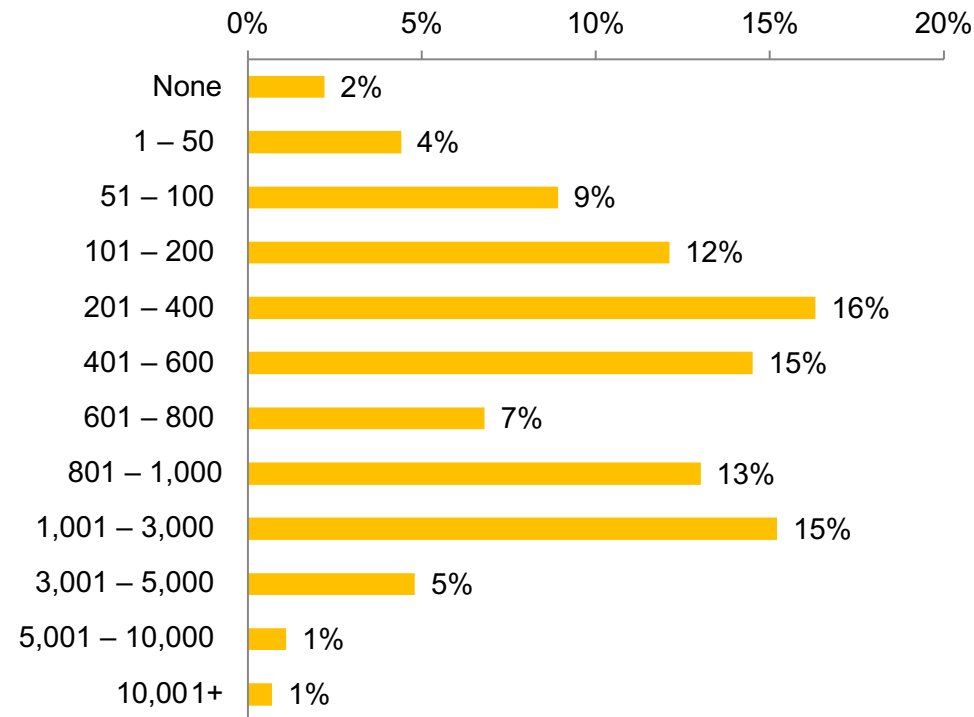


- The average number of rounds used by MSR owners in the last 12 months is 907.
- Approximately half of MSR owners fired between 1 and 400 shots in the last 12 months, the other half shooting more than 400 rounds.

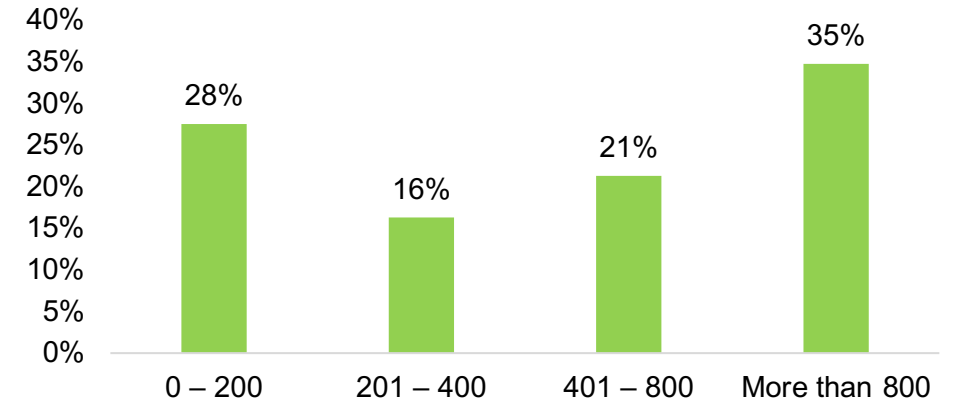
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MSR Usage and Activities: Ammunition Used – Projected Amount

Projected Rounds of Ammo Fired Through MSR In Next 12 Months



Projected Rounds of Ammo Fired (Grouped)

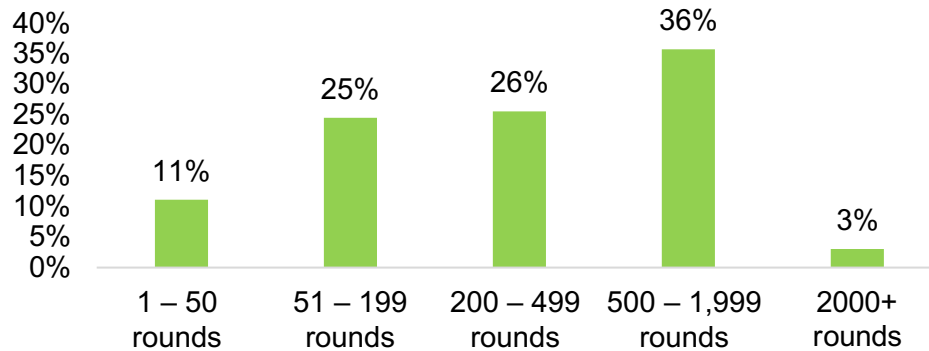


- The average number of rounds that MSR owners project they will fire in the next 12 months is 984.
- Over one-third of MSR owners anticipate firing more than 800 rounds of ammunition in the next 12 months.

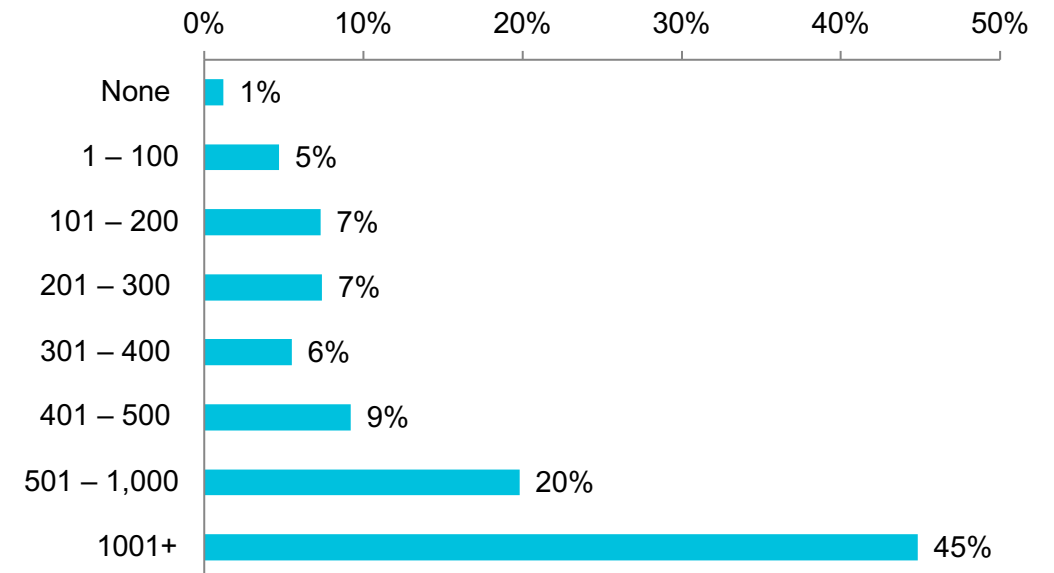
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MSR Usage and Activities: Ammunition Quantity Purchased, Kept On Hand

Quantity of MSR Ammo Typically Purchased



Number of MSR Rounds Owned/Kept on Hand

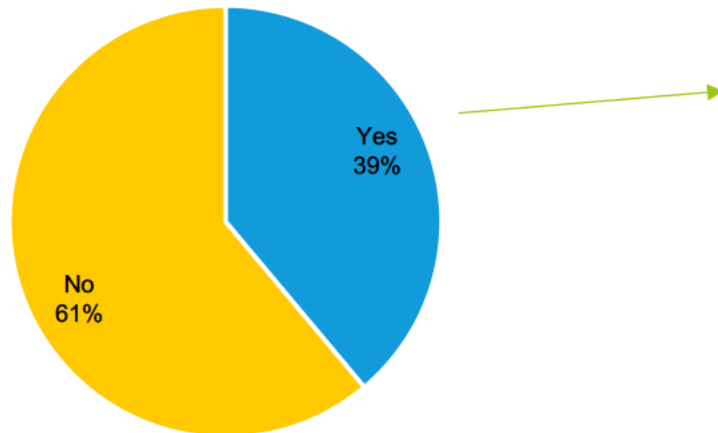


- When purchasing ammunition, the average number of ammo rounds typically purchased by MSR owners is 637.
- 36% of MSR owners typically purchase between 500-1,999 rounds.
- Nearly half of MSR owners own/keep more than 1,000 rounds on hand.

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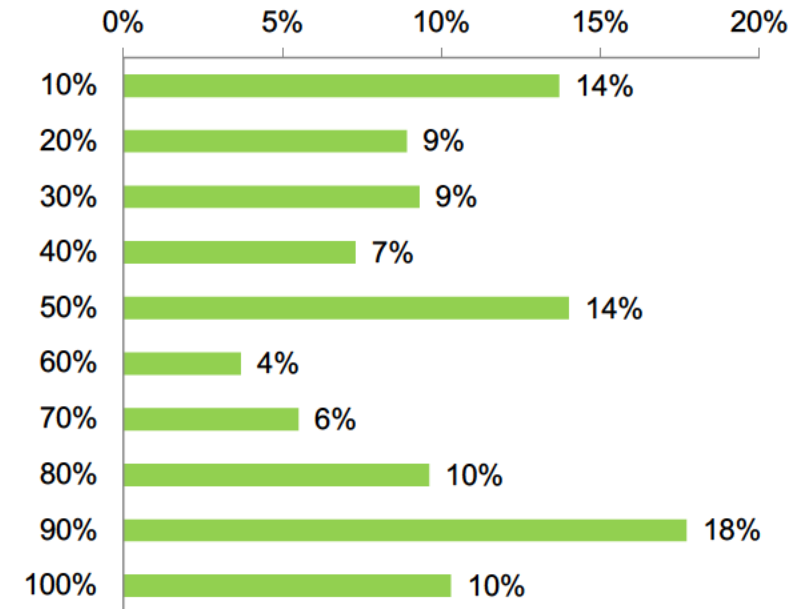
MSR Usage and Activities: Ammunition Reloads

Do you reload your own ammunition?



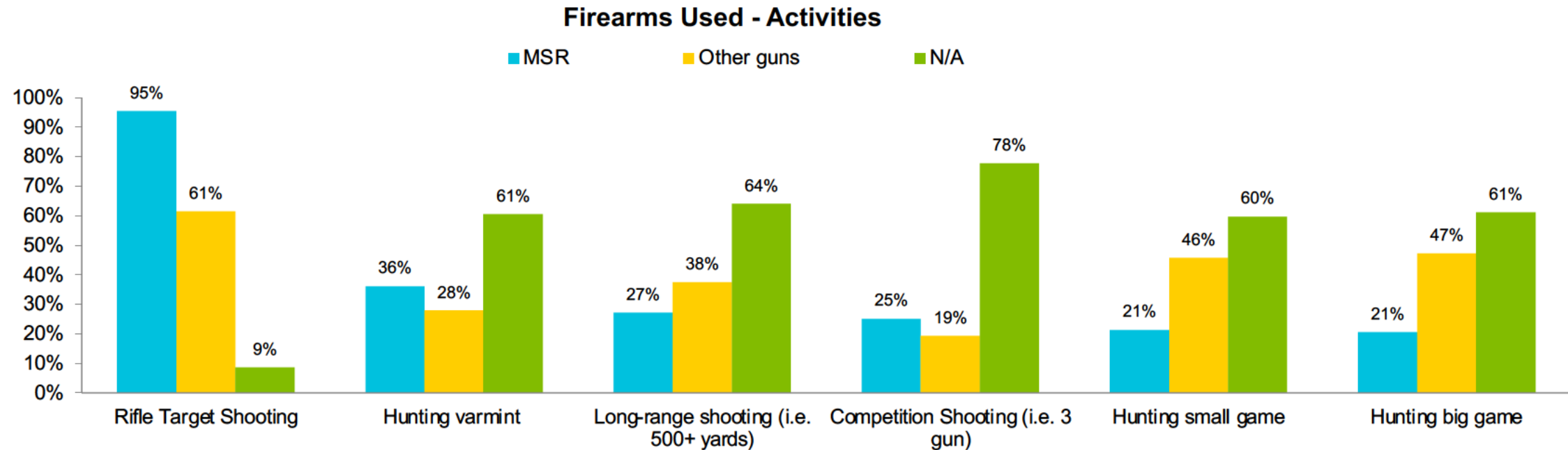
- 6 out of 10 MSR owners do not reload their own ammunition.
- Of the 40% who do, the average percentage of their ammunition they reload is 53%.

Percentage of Ammo Reloaded



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MSR Usage and Activities: Firearms Used

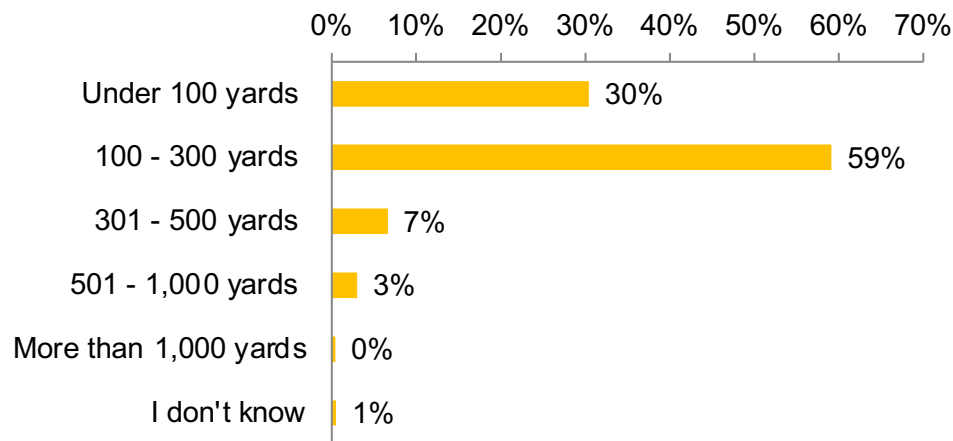


- 95% of respondents used their MSR to rifle target shoot.

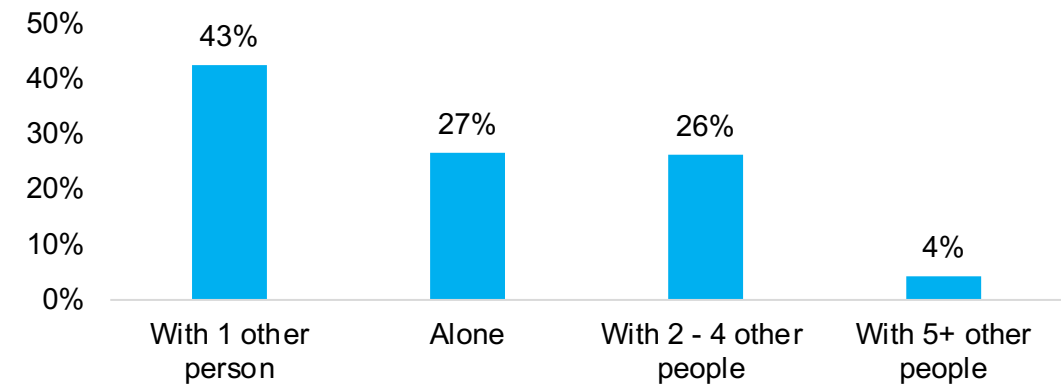
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MSR Usage and Activities: Target Shooting/Hunting

Typical Distance When Using MSR for Hunting/Target Shooting



Target Shooting - Do you generally go alone or with others?



- The most frequent distance that MSR owners hunt/target shoot at is 100-300 yards.
- 43% generally go target shooting with one other person. 27% go alone.

Respondent Profile: Favorite Part About Owning MSR

Respondents were asked in an open-ended question to explain their favorite part of owning an MSR. Common themes in answers include:

FUN/ENJOYMENT OF SHOOTING

- General enjoyment of shooting; relaxing
- Challenge of target shooting, hunting; improving
- Camaraderie with others, quality time with loved ones
- Ability to customize/building from parts

EXERCISING FREEDOM/2A RIGHTS

- Represents freedom and America
- Tradition and history

EASE OF USE

- Lightweight
- Low-recoil
- Accurate, versatile
- Instills confidence

RELIABLE

- Craftsmanship and engineering
- Peace of mind — excellent for home defense

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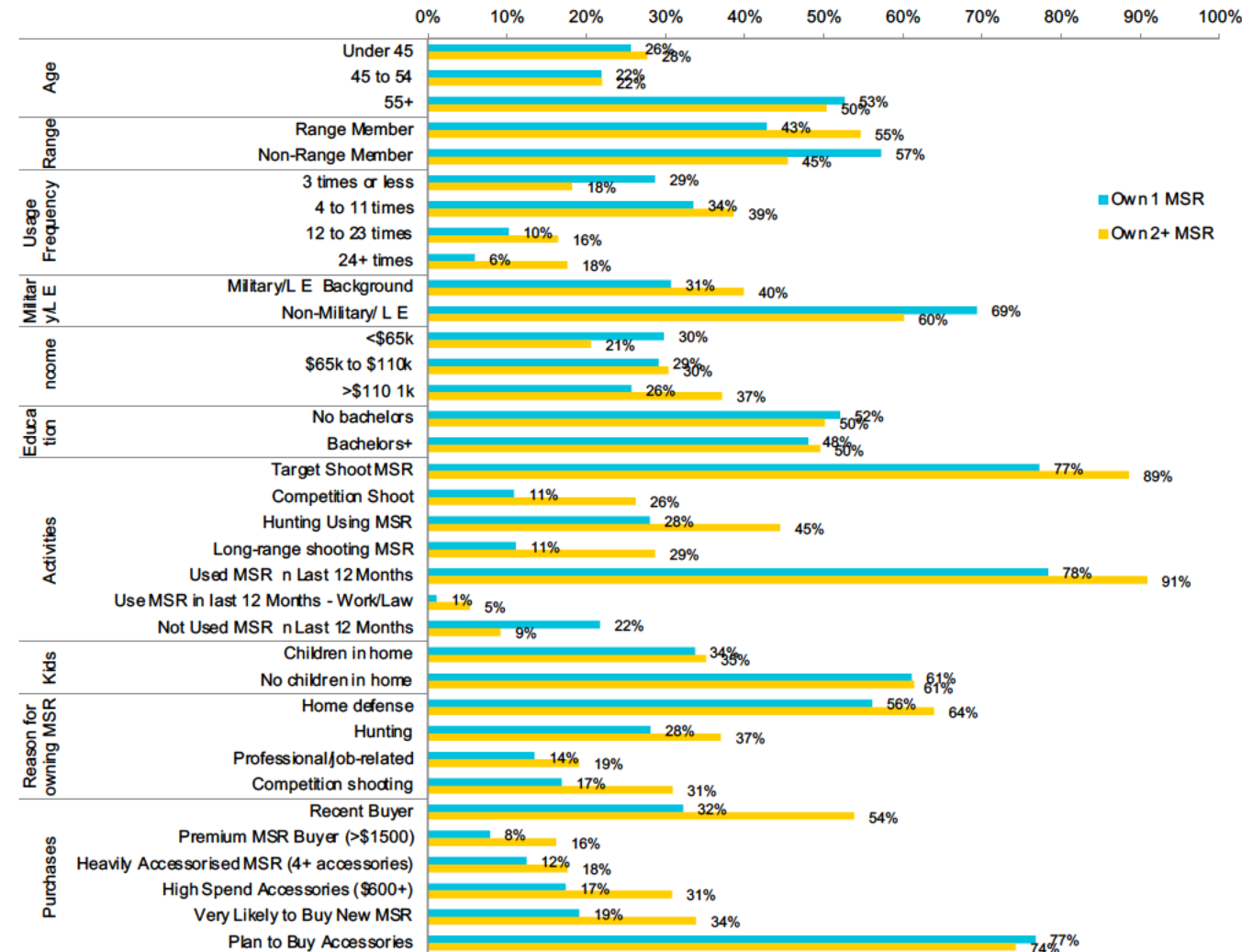


Section 4: MSR Owner Profiles



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Profile: Single MSR Owners vs Multi-MSR Owners

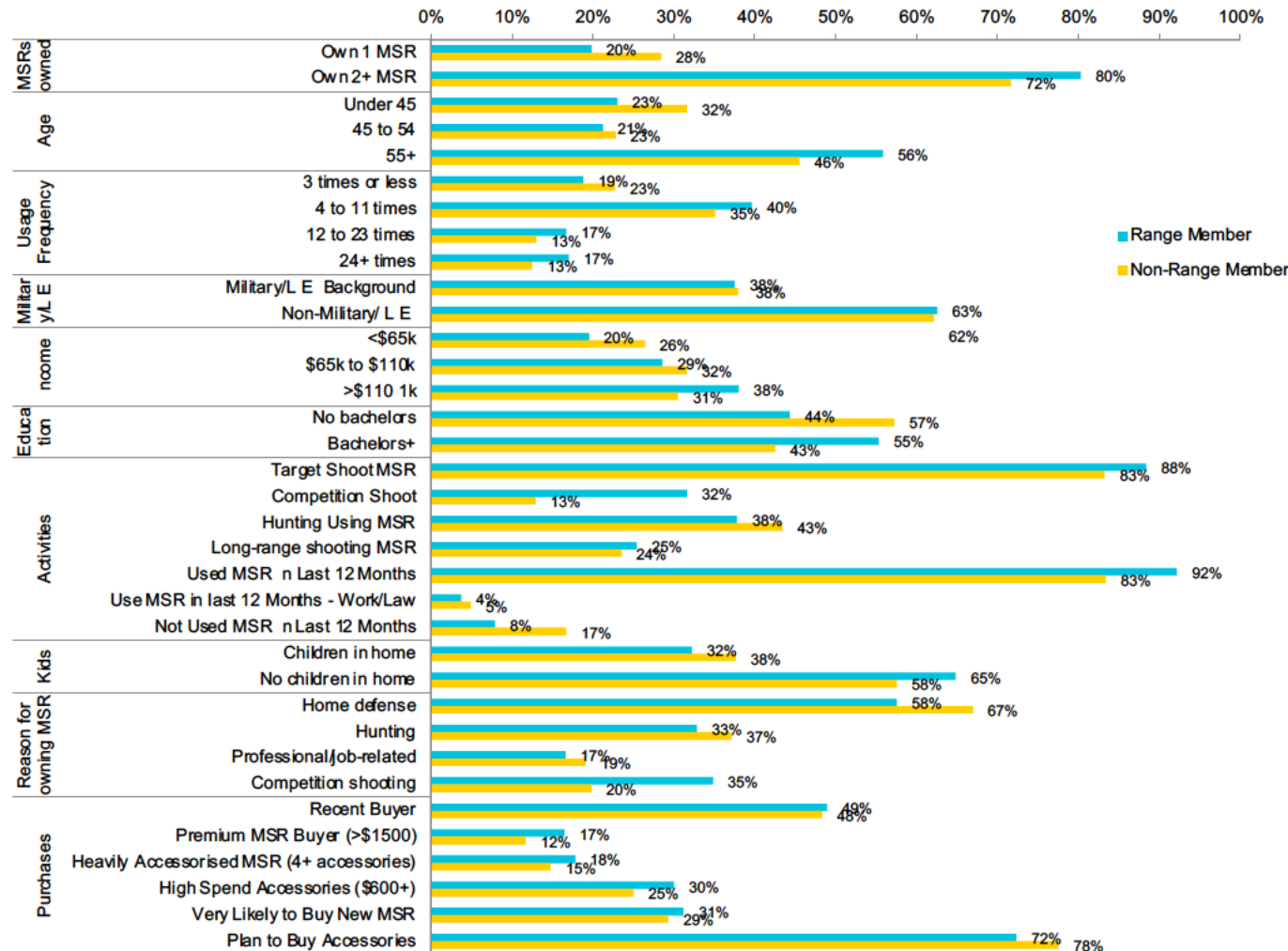


Multiple-MSR owners are relatively more likely to be:

- Ages 55+
- Non-range members
- Those who used MSR 11 or less times in the last 12 months
- Not from a military/law enforcement background
- Those with an income under \$65k, though there is fairly even distribution across ranges
- Users of MSR for target shooting
- Those with no kids at home
- Owners of a MSR(s) for home defense purposes
- Those who plan to buy MSR accessories in the next 12 months

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Profile: Range vs Non-Range Member

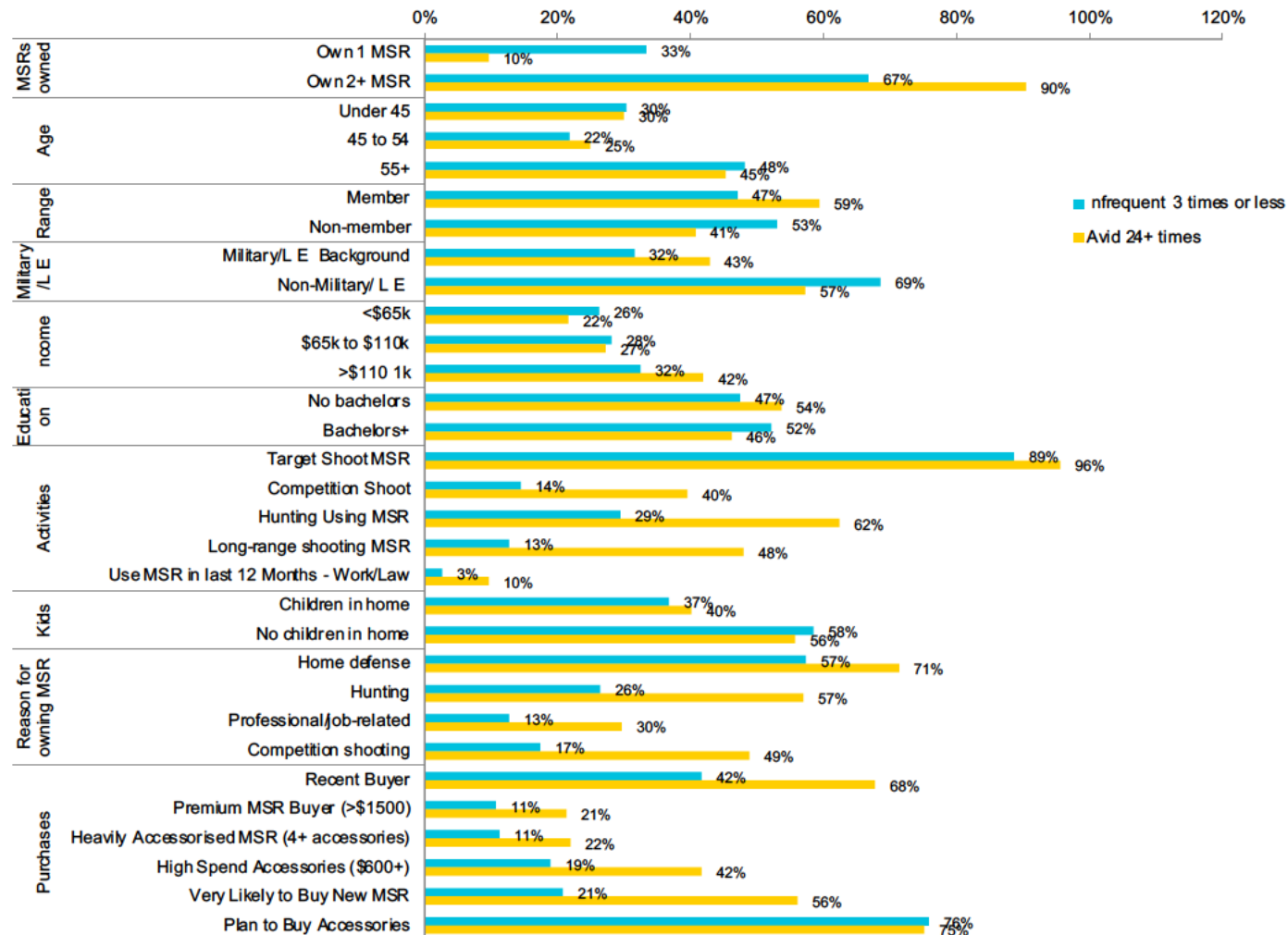


MSR owners who are shooting range members are relatively more likely to be:

- Owners of multiple MSRs
- Ages 55+
- Occasional users of MSRs – 4 to 11 times times in the last 12 months
- Not from a military/law enforcement background
- Those with an income over \$110k
- Users of MSR for target shooting
- Those with no kids at home
- Owners of a MSR(s) for home defense, hunting, competition shooting
- Those who plan to buy MSR accessories in the next 12 months

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Profile: Infrequent vs Avid MSR Users

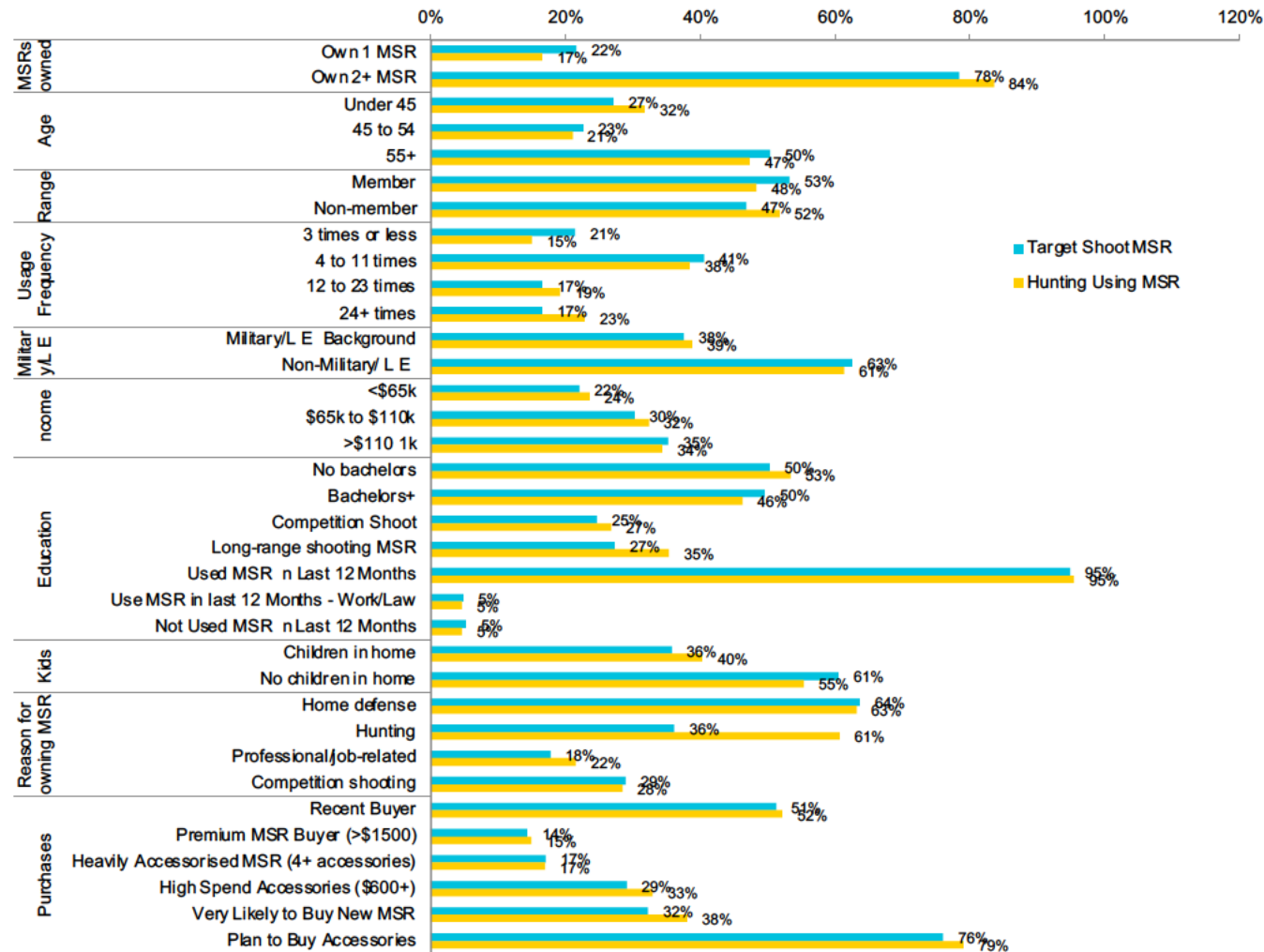


Avid MSR owners are relatively more likely to be:

- Owners of multiple MSRs
- Ages 55+
- A member of a shooting range
- Not from a military/law enforcement background
- Those with an income over \$110k
- Users of MSR for target shooting and hunting
- Those with no kids at home
- Owners of a MSR(s) for home defense, hunting, competition shooting
- Those who recently bought a MSR in 2020 or 2021, plan to buy accessories or a new MSR in the next 12 months

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Profile: Target Shooters vs Hunters

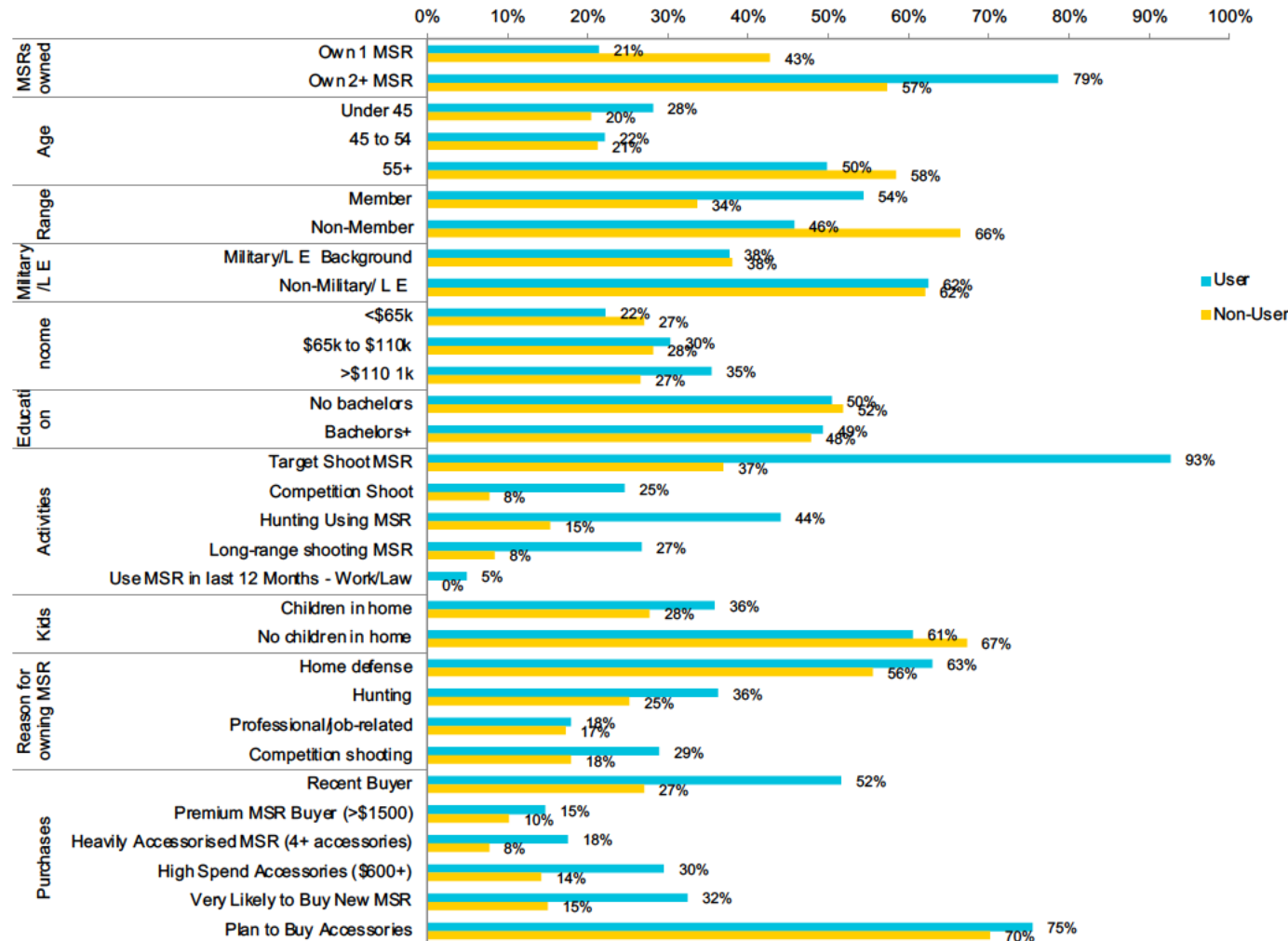


Target shooters and hunters have similar profiles. Hunters are slightly more likely to be:

- Owners of multiple MSRs
- Under 45 years old
- A frequent or avid user of MSRs
- Those without a bachelors degree
- Users of MSR for target shooting and hunting
- Those with kids at home
- Owners of a MSR(s) for home defense, hunting, competition shooting
- Those who are likely to buy a new MSR in the next 12 months

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Profile: Owners Who Haven't Used MSR In Last 12 Months

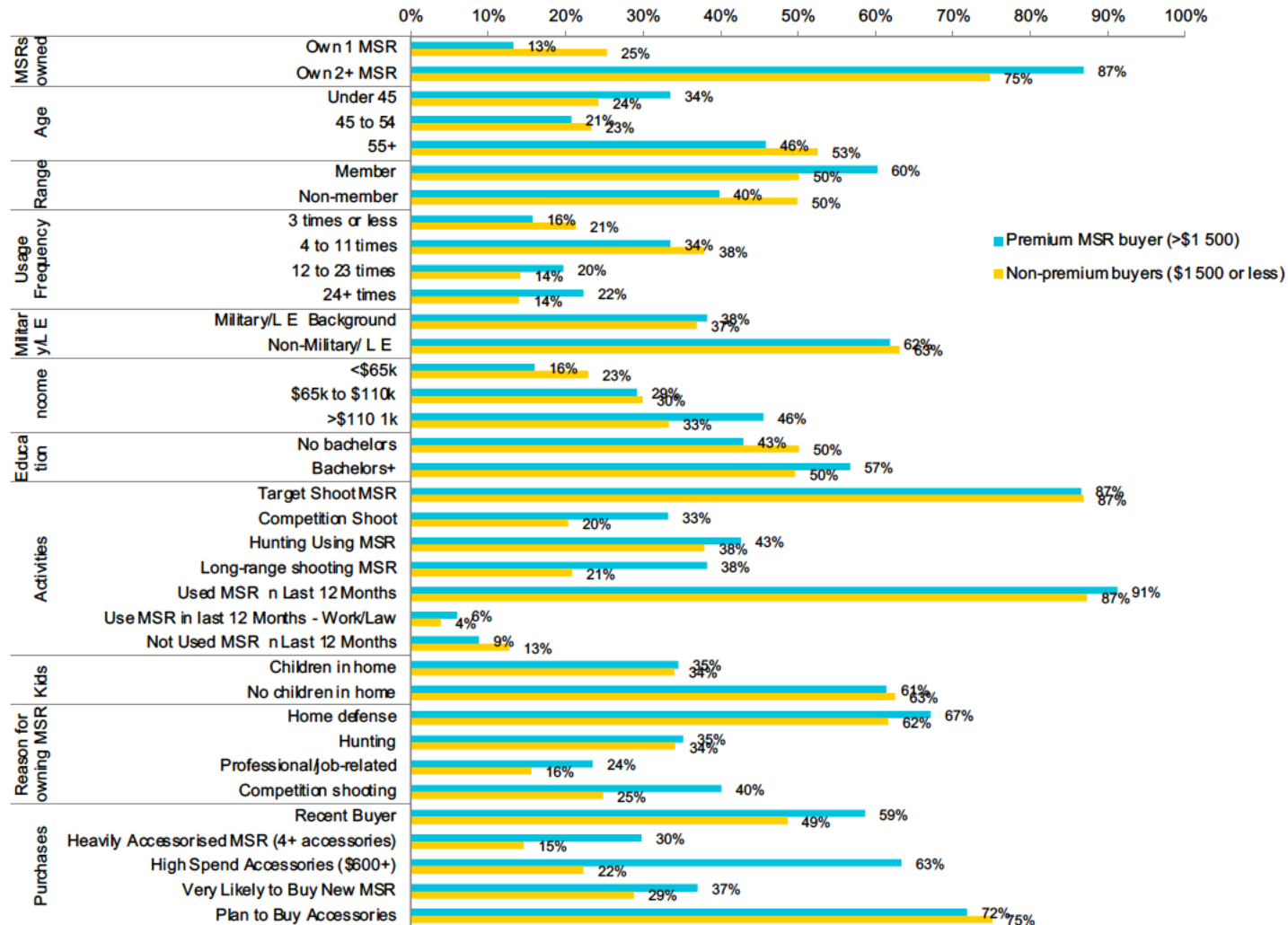


Non-MSR users are relatively more likely to be:

- Owners of multiple MSRs
- Ages 55 & older
- Not a member of a shooting range
- Those with a household income of less than \$110k
- Those with no kids at home
- Owners of a MSR(s) for home defense, some hunting
- Those who plan to buy accessories for their MSR in the next 12 months

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Profile: Premium Buyers (>\$1500 spent on MSR) vs Non-Premium Buyers

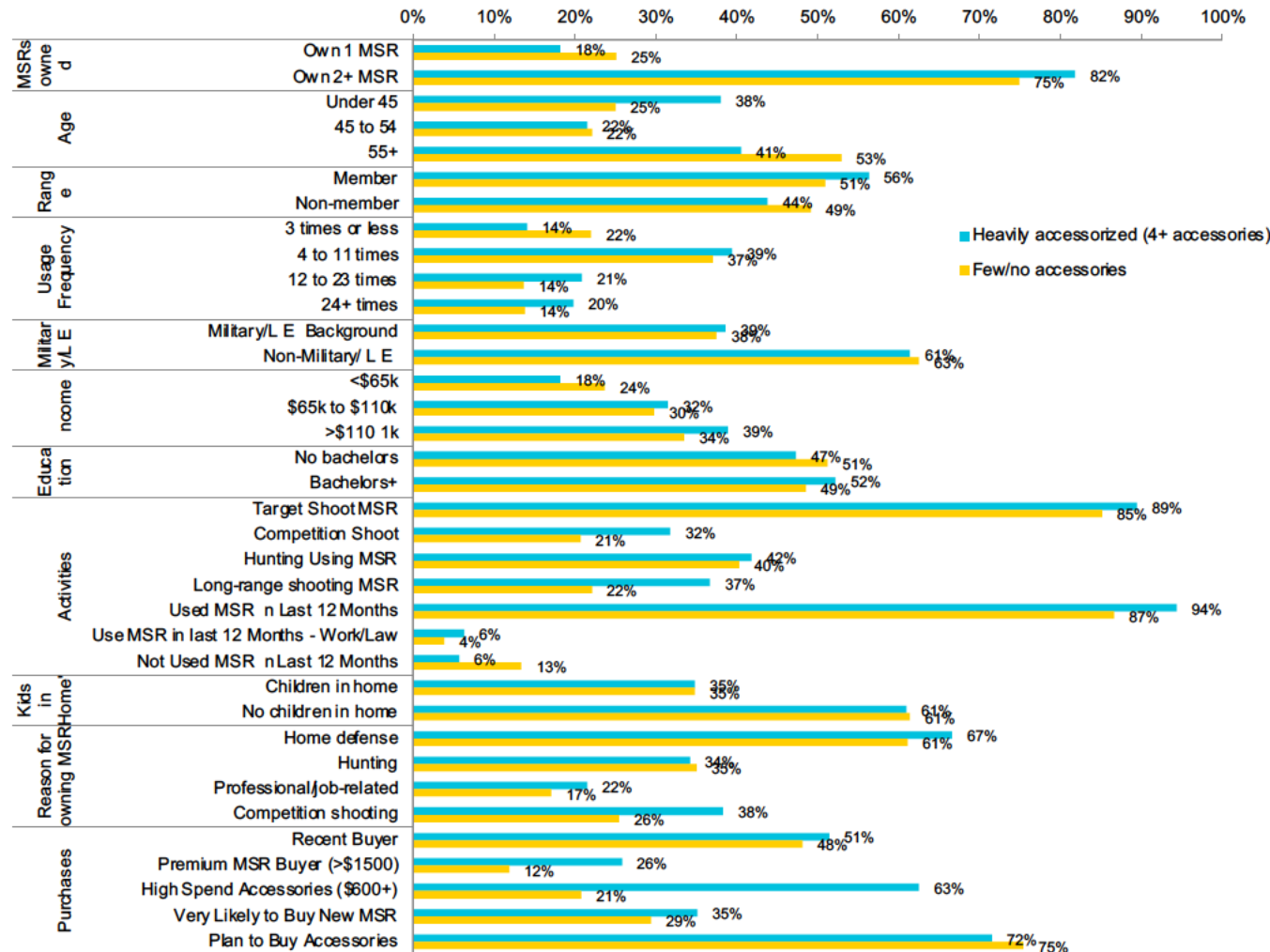


Premium MSR buyers are relatively more likely to be:

- Owners of multiple MSRs
- Ages 55 & older
- A member of a shooting range
- Regular users of MSRs, using 4 to 11 times a year
- Those with a household income greater than \$110k
- With a bachelors degree or more
- Using MSR for target shooting, competition shooting, and hunting.
- Owners of a MSR(s) for home defense, competition shooting, hunting
- Recent buyers (purchased MSR in 2021 or 2020), high-spenders on accessories (\$600+) and very likely to buy new MSR in the next 12 months.

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Profile: Heavily Accessorized (4+ accessories) MSR Owners

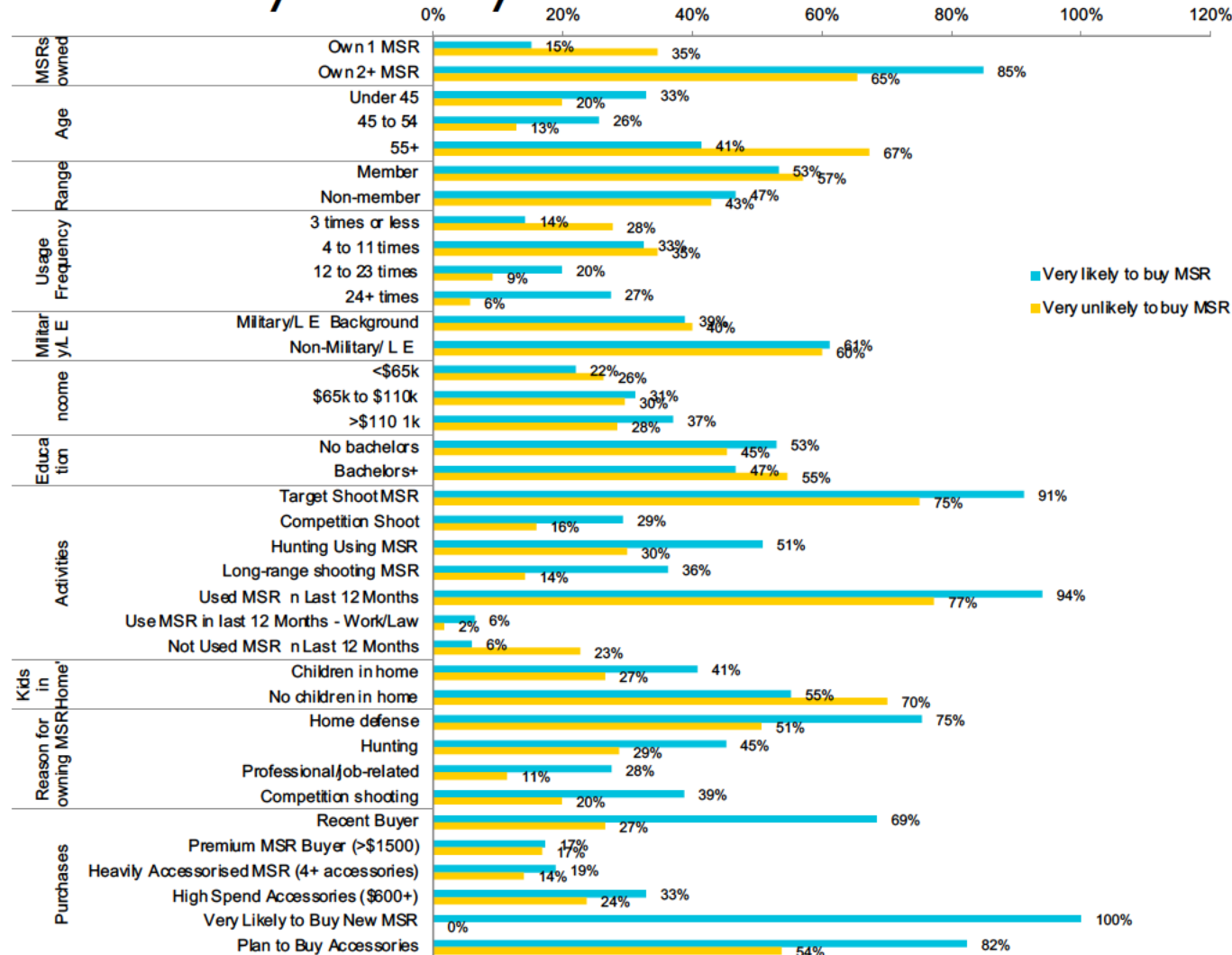


Owners of heavily accessorized MSRs are relatively more likely to be:

- Owners of multiple MSRs
- Under 45 years old
- A member of a shooting range
- Frequent/avid users of MSRs
- Those with a household income greater than \$110k
- With a bachelors degree or more
- Using MSR for target shooting, competition shooting, and hunting.
- Owners of a MSR(s) for home defense, competition shooting, hunting
- Premium MSR buyers (>\$1500 spent on last MSR), high-spenders on accessories (\$600+) and very likely to buy new MSR in the next 12 months.

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Profile: Likely MSR buyers

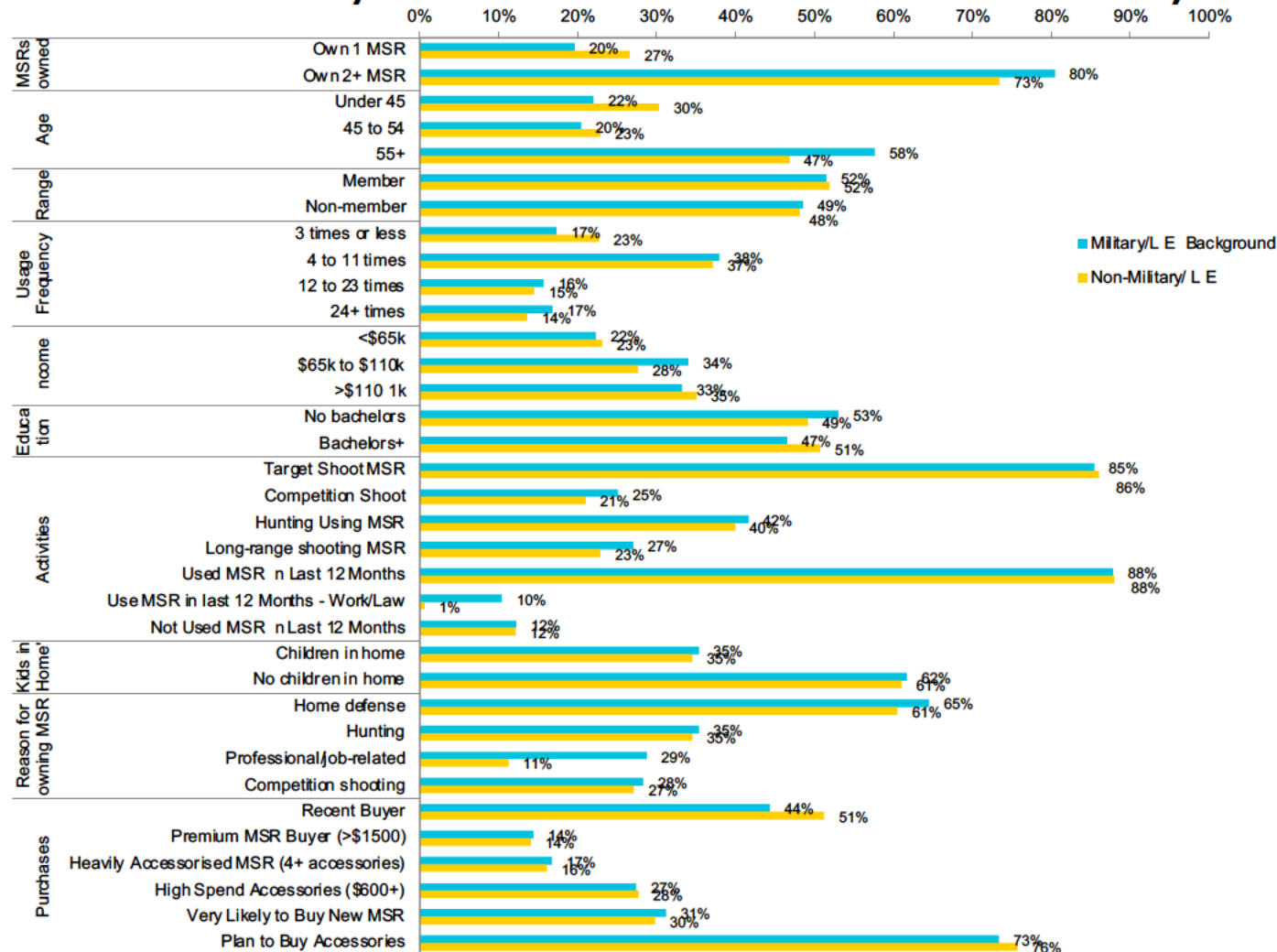


Likely MSR buyers are relatively more likely to be:

- Owners of multiple MSRs
- Under 45 years old
- Frequent/avid users of MSRs
- Those with a household income greater than \$110k
- With a bachelors degree or more
- Using MSR for target shooting, competition shooting, and hunting.
- Owners of a MSR(s) for home defense, competition shooting, hunting
- Premium MSR buyers (>\$1500 spent on last MSR), high-spenders on accessories (\$600+) and very likely to buy new MSR in the next 12 months.

NSSF MSR Consumer Study - Report of Findings

Profile: Military/Law Enforcement vs Non-Military/Law Enforcement



MSR owners with a military/law-enforcement background are relatively more likely to be:

- Owners of multiple MSRs
- 55 years old or older
- Frequent/avid users of MSRs
- Those with a household income of \$65-\$110k
- Those without a bachelors degree or more
- Using MSR for competition shooting or work
- Owners of a MSR(s) for home defense or professional/job-related purpose

NSSF MSR Consumer Study - Report of Findings



Section 5: Clusters/Segmentation



Clusters Analysis/Market Segmentation Explained

A Cluster Analysis is method used in market segmentation to help marketers identify specific consumer groups based on a specific set and sub-set of demographic and specific product usage patterns. Market segmentation means dividing the market into distinct groups of individual segments or clusters with similar wants or needs and behaviors.

A market segment or cluster is a sub-set of a people, in this case, MSR owners with one or more characteristics that cause them to demand similar product and/or services based on qualities of those products — such as usage activity and demographics. A true market segment meets all of the following criteria: it is distinct from other segments (different segments have different needs), it is homogeneous within the segment (exhibits common needs), and responds similarly to market stimulus and media.

In the MSR Study, we used the following variables to establish clusters:

- Age
- Reasons for owning an MSR
- Annual Household Income
- Number of MSRs Owned
- Military/Law-Enforcement Affiliation

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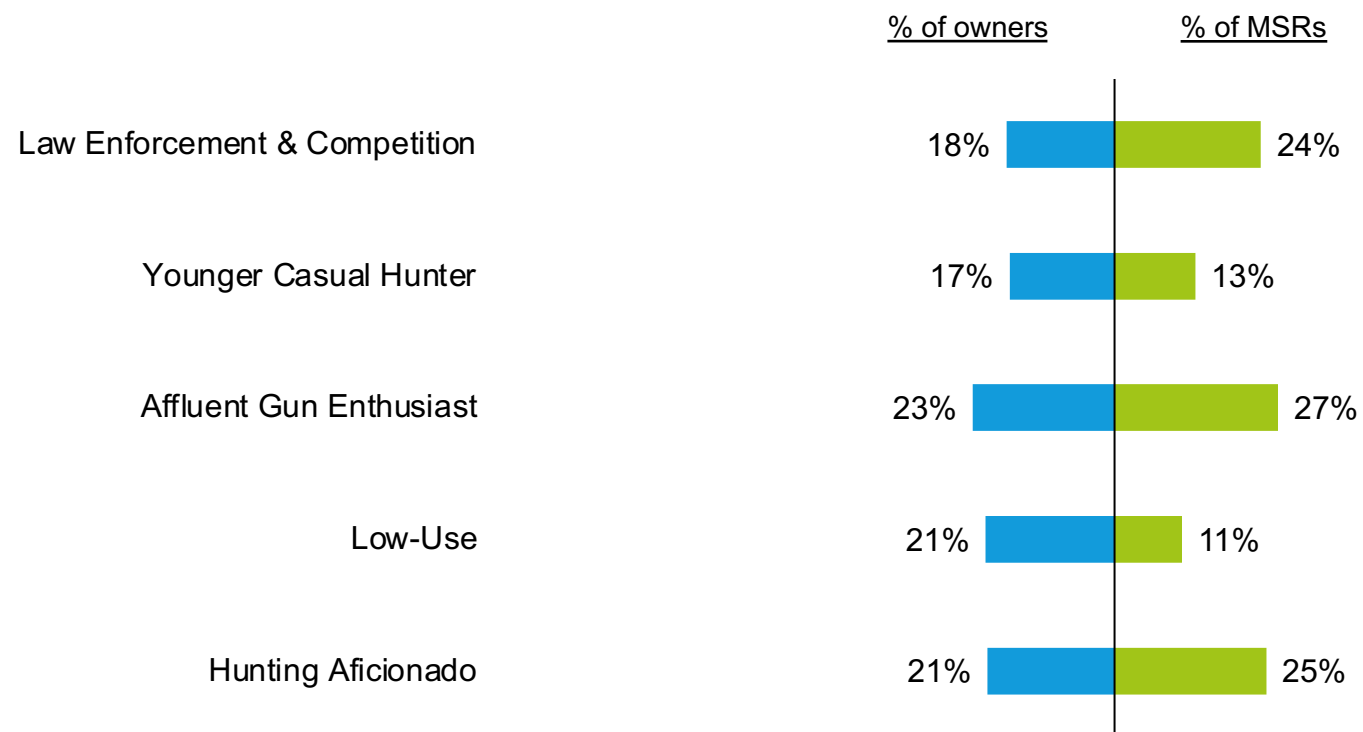
MSR Clusters Summary

	1. Law Enforcement & Competition	2. Casual Hunter	3. Affluent Gun Enthusiast	4. Low-Use Home Defense	5. Hunting Aficionado
% of owners	18%	17%	23%	21%	21%
% of MSRs	24%	13%	27%	11%	25%
Number of MSRs Owned	3+	1	3+	1	3+
Age	Under 45	Under 45	45 to 54	55+	55+
Reasons for Owning a MSR	Professional use/job-related, competition	Hunting	Competition shooting	Home defense	Hunting
Annual Household Income	\$65 to \$110k	<\$65k	>\$110k	<\$65k	>\$110k
Military/Law-Enforcement Affiliation	Military/L.E.	Non-Military/L.E.	Non-Military/L.E.	Slightly more Military/L.E.	Slightly more non-Military/L.E.
MSR usage frequency (last 12 months)	More than 24 times	3 times or less	12 to 23 times	3 times or less	4 to 11 times
Range Member	Slightly more likely to be a range member	Non-member	Range Member	Non-member	Non-member
Education	Slightly more likely to not have a bachelors	No bachelors	Bachelors+	Both bachelors+/no bachelors	Bachelors+
Introduction to MSRs	Military/job, Other	Family/friends, personal interest	Shooting Range	Media/internet, military/job	Family/friends, personal interest
MSR Activities In Last Year	Use MSR for work, competition shooting	Hunting, long-range shooting	Competition shooting	Not Used MSR	Hunting
MSR Purchase Behavior	Very likely to buy MSR in next year, premium MSR buyer (>\$1500 for MSR), High-spend accessories, heavily accessorized, recent buyer	Very likely to buy MSR in next 12 months, plans on buying accessories	Premium MSR buyer (>\$1500), heavily accessorized MSR, high-spend on accessories, recent buyer	Slightly less likely to plan to buy accessories in next year	Recent buyer (obtained MSR in 2020 or 2021)
Place of Purchase	Mom & Pop Retail Store	Gun Show	Gun show, custom built	Chain/Big-Box Retail	Bought as kit/custom-built

NSSF MSR Consumer Study – Report of Findings

MSR Clusters Summary

Clusters: Makeup of MSR Owners & Total MSRs Owned



How to Read Cluster Graphs

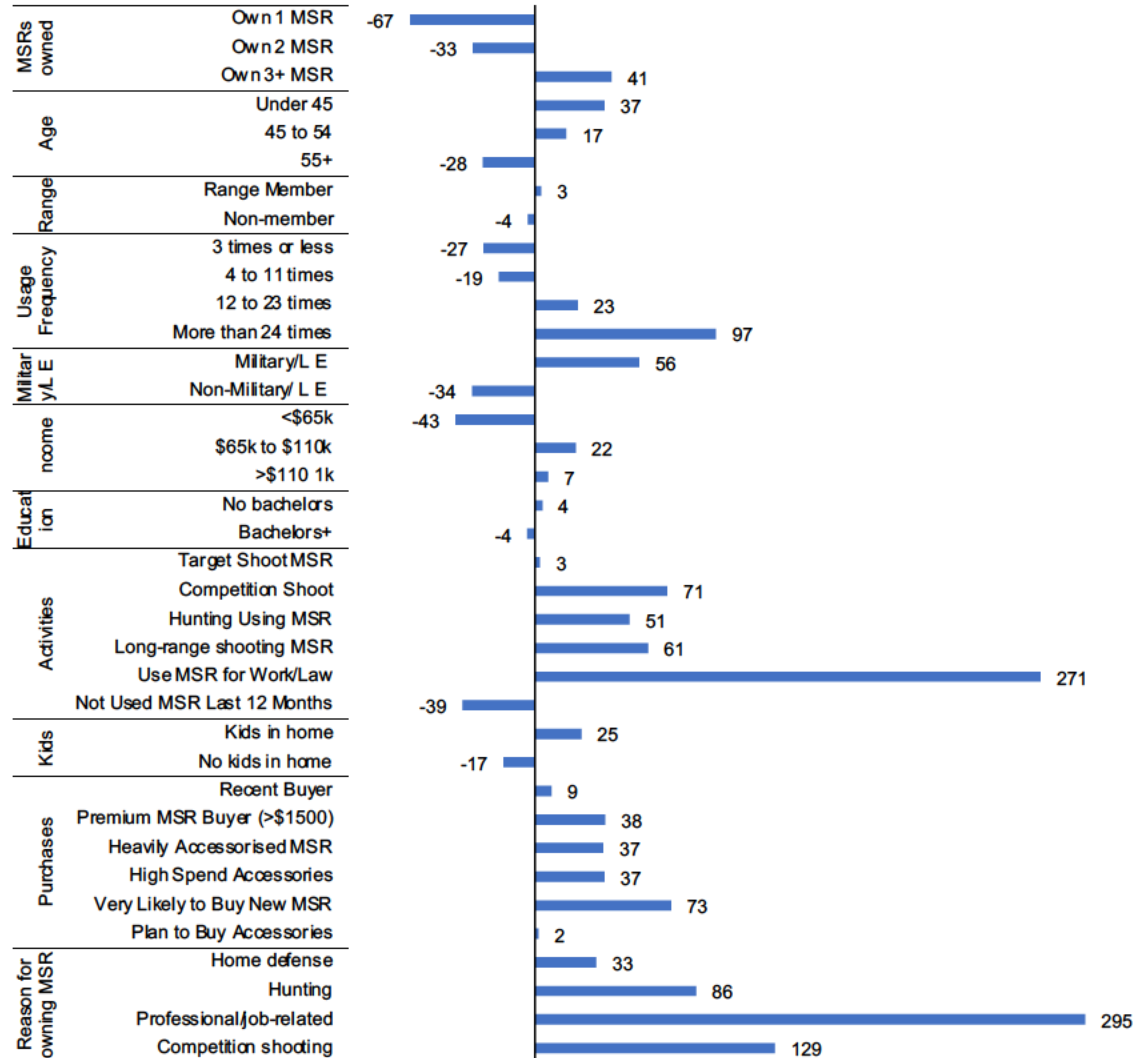
In the cluster graphs, the overall MSR sample profile is represented by a value of 0. The index is calculated by dividing the profile of the cluster (percentage of that cluster for a category) by the profile of the total MSR population. An index of 20 means the cluster is 20% more likely to exhibit that behavior or be a part of that group. For examples, MSR owners in Cluster 1 (Law Enforcement & Competition) have an index of 37 for ages under 45 —this means a MSR owner in this cluster is 37% relatively more likely to be under 45 years old compared to the overall MSR user population.

We describe this as a relative measure since it does not account for the percentage of the MSR owner population. Using our previous example, MSR owners in Cluster 1 (Law Enforcement & Competition) have an index of 37 for ages under 45; this does not mean MSR owners under 45 form the majority of Cluster 1, only that they're over-represented compared to the overall MSR owner population.

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Cluster 1: Law Enforcement & Competition

Index (All MSR Owners = 0)



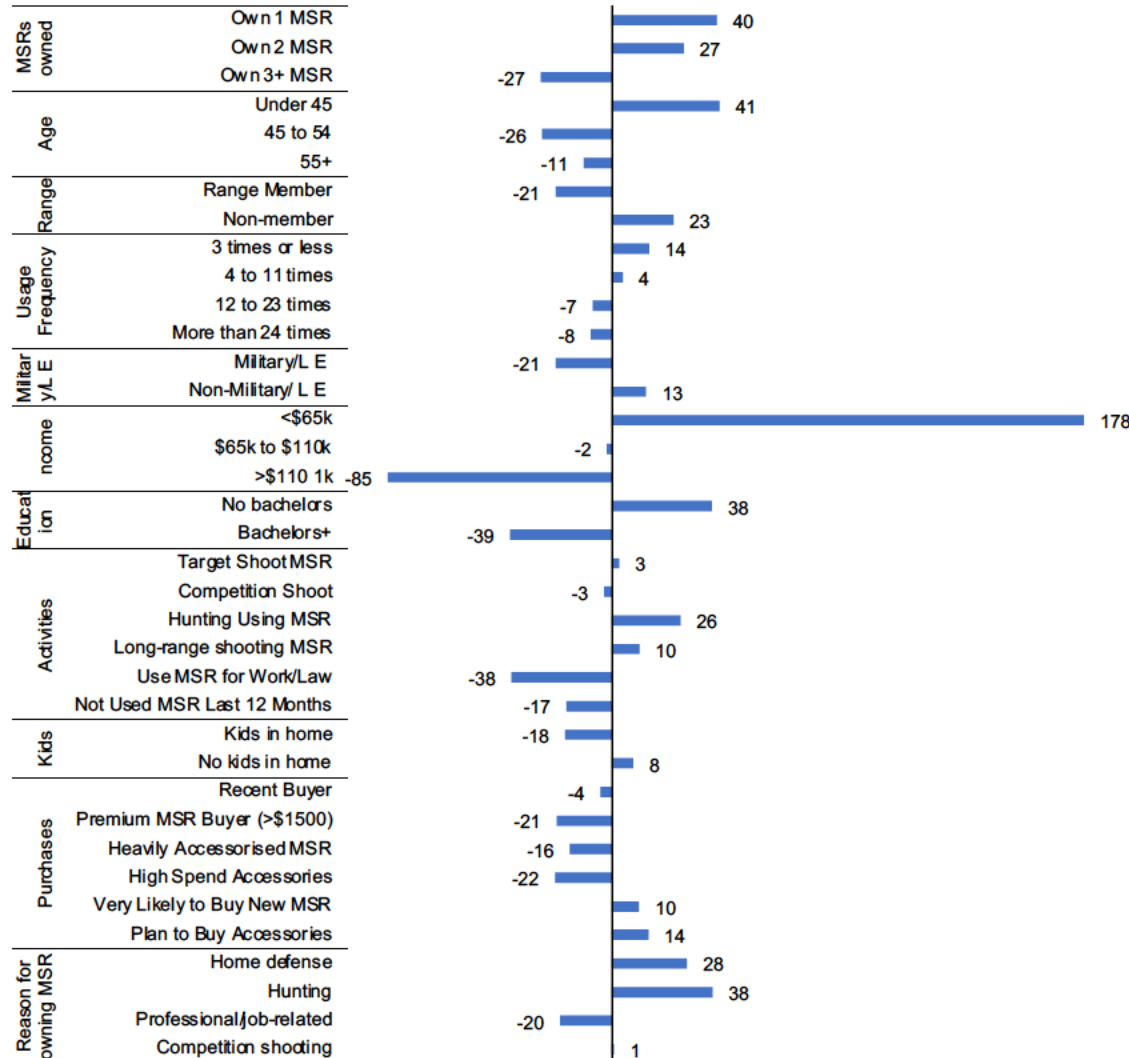
The **Law Enforcement & Competition** Cluster accounts for 18% of MSR owners. They tend to be:

- Owners of 3+ MSRs
- Under 45 years old
- Avid users of MSR
- From a military/law enforcement background
- Those with income of \$65k to \$110k
- Users of MSR for work/law, competition shooting
- Those with kids at home
- Very likely to buy new MSR in next 12 months, a premium buyer of MSRS (spending more than \$1500 most recently acquired MSR), high-spenders on accessories

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Cluster 2: Casual Hunter

Index (All MSR Owners = 0)



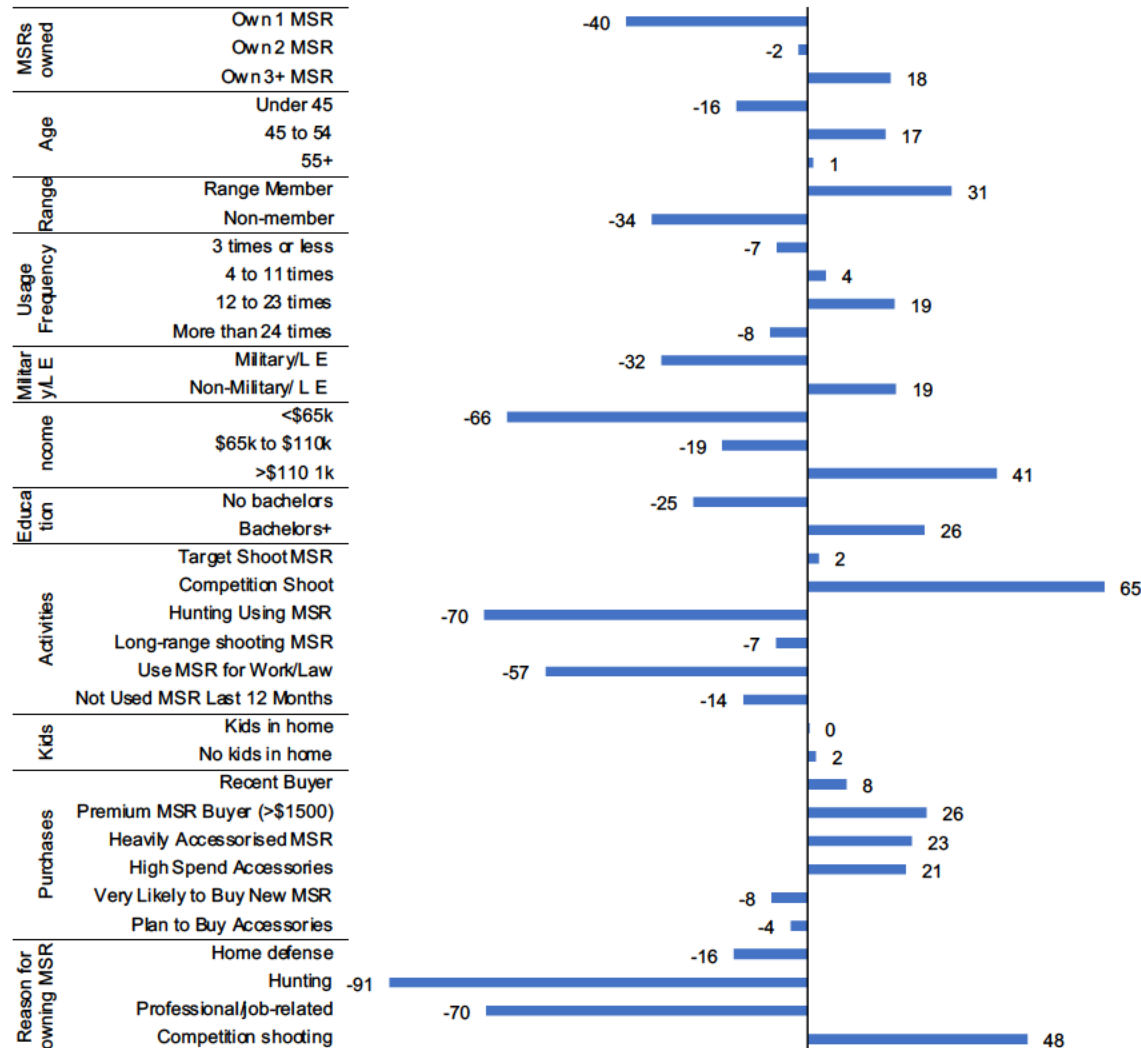
The **Casual Hunter** Cluster accounts for 17% of MSR owners. They tend to be:

- Owners of 1 MSR
- Under 45 years old
- Not members of a shooting range
- Casual users, using their MSR 3 times or less in the past 12 months
- Not from a military or law enforcement background
- Those with income less than \$65k
- Those without a bachelors degree
- Users of MSRs for hunting and long-range shooting
- Those without kids at home
- Very likely to buy new MSR in next 12 months and plan to buy accessories.
- Owners of MSRs for hunting and self-defense

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Cluster 3: Affluent Gun Enthusiast

Index (All MSR Owners = 0)



The **Affluent Gun Enthusiast** Cluster accounts for 23% of MSR owners. They tend to be:

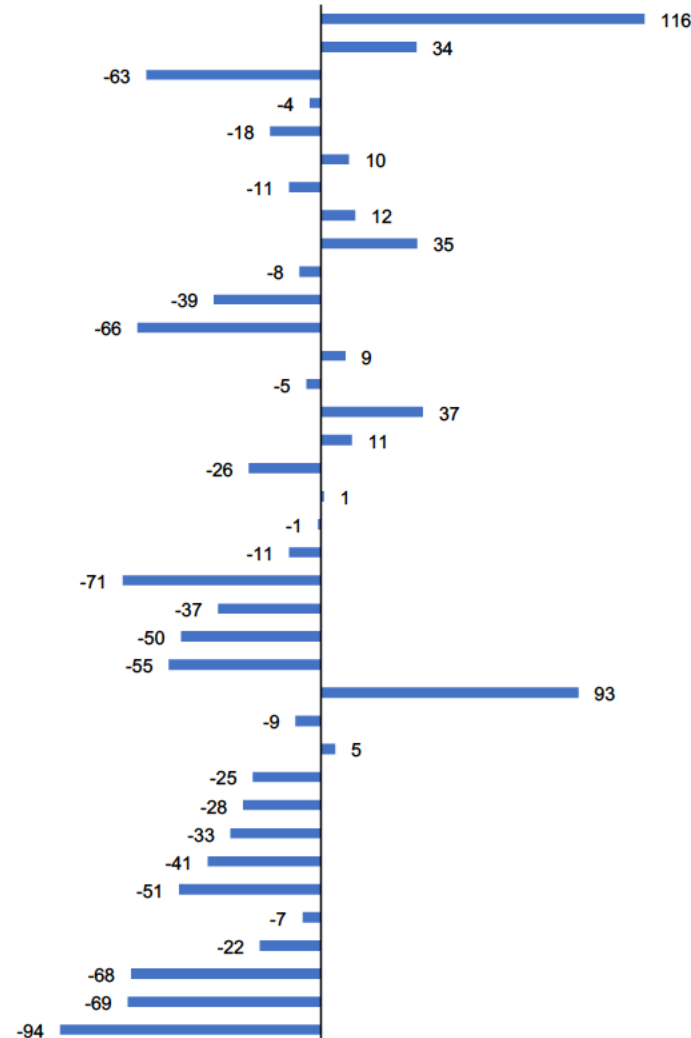
- Owners of 3+ MSR
- 45 to 54 years old
- Members of a shooting range
- Frequent users, using their MSR 12 to 23 times in the last 12 months
- Not from a military or law enforcement background
- Those with income greater than \$110k
- Those with a bachelors degree
- Users of MSRs for competition shooting
- Premium MSR Buyers (>\$1500 on most recent MSR, heavily accessorized and high spender on accessories)
- Owners of MSRs for competition shooting

NSSF MSR Consumer Study – Report of Findings

Cluster 4: Low-Use Self Defense

Index (All MSR Owners = 0)

MSRs owned	Own 1 MSR
	Own 2 MSR
	Own 3+ MSR
Age	Under 45
	45 to 54
	55+
Range	Range Member
	Non-member
Usage Frequency	3 times or less
	4 to 11 times
	12 to 23 times
	More than 24 times
Military/LE	Military/LE
	Non-Military/LE
Income	<\$65k
	\$65k to \$110k
	>\$110.1k
Education	No bachelors
	Bachelors+
Activities	Target Shoot MSR
	Competition Shoot
	Hunting Using MSR
	Long-range shooting MSR
	Use MSR for Work/Law
	Not Used MSR Last 12 Months
Kids	Kids in home
	No kids in home
Purchases	Recent Buyer
	Premium MSR Buyer (>\$1500)
	Heavily Accessorised MSR
	High Spend Accessories
	Very Likely to Buy New MSR
Reason for owning MSR	Plan to Buy Accessories
	Home defense
	Hunting
	Professional/job-related
	Competition shooting



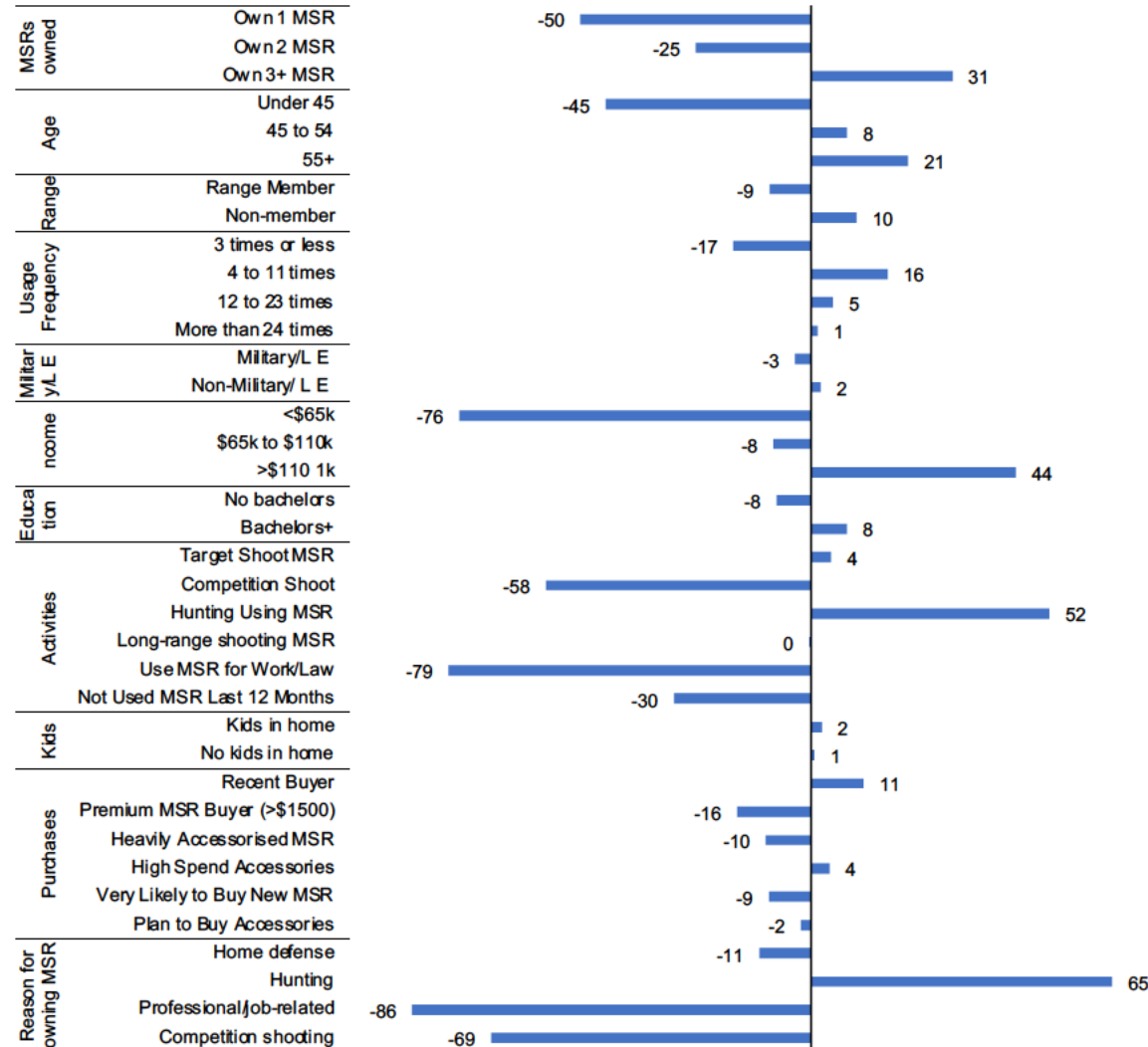
The **Low-Use Self Defense** Cluster accounts for 21% of MSR owners. They tend to be:

- Owners of 1 MSR
- 55 years old or older
- Not members of a shooting range
- Infrequent users, using their MSR 3 times or less in the last 12 months
- Slightly more likely to be from a military or law enforcement background
- Those with income less than \$65k
- Those who did not use their MSR in the last 12 months
- Those with no kids at home
- Less likely to buy new MSR or be a premium buyer
- Owners of MSRs for home defense

NSSF MSR Consumer Study - Report of Findings

Cluster 5: Hunting Aficionado

Index (All MSR Owners = 0)



The **Hunting Aficionado** Cluster accounts for 21% of MSR owners. They tend to be:

- Owners of 3+ MSRs
- 55 years old or older
- Not members of a shooting range
- Occasional MSR users, using their MSR 4 to 11 times in the last 12 months
- Slightly more likely to not be from a military or law enforcement background
- Those with income of greater than \$110k
- Those with a bachelors degree
- Those used their MSR for hunting in the last 12 months
- Recent buyers of a MSR (in 2020 or 2021)
- Less likely to buy new MSR or be a premium buyer
- Owners of MSRs for hunting

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Section 6: Sample Profile



NSSF MSR Consumer Study – Report of Findings

Respondent Profile: Organizations

Current Membership or Recent Donation to Organizations

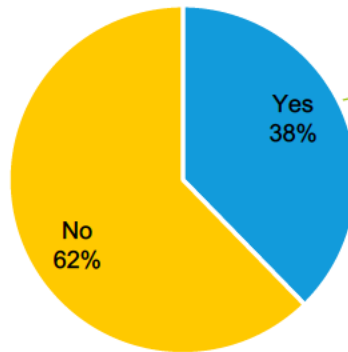


- When asked what organizations they are a member of or recently donated to, the most-selected organization was the NRA (61%), chosen more than twice as much as any other organization.
- 21% of MSR owners are not members of or recently donated to any organizations listed.
- 12% are members or recently donated to the NSSF.
- Of the 19% who selected “Other” organizations, the most common mentions were:
 - Firearms Policy Coalition
 - Liberal Gun Club/Liberal Gun Owners
 - Second Amendment Foundation
 - National Skeet Shooting Foundation
 - National Sporting Clays Association

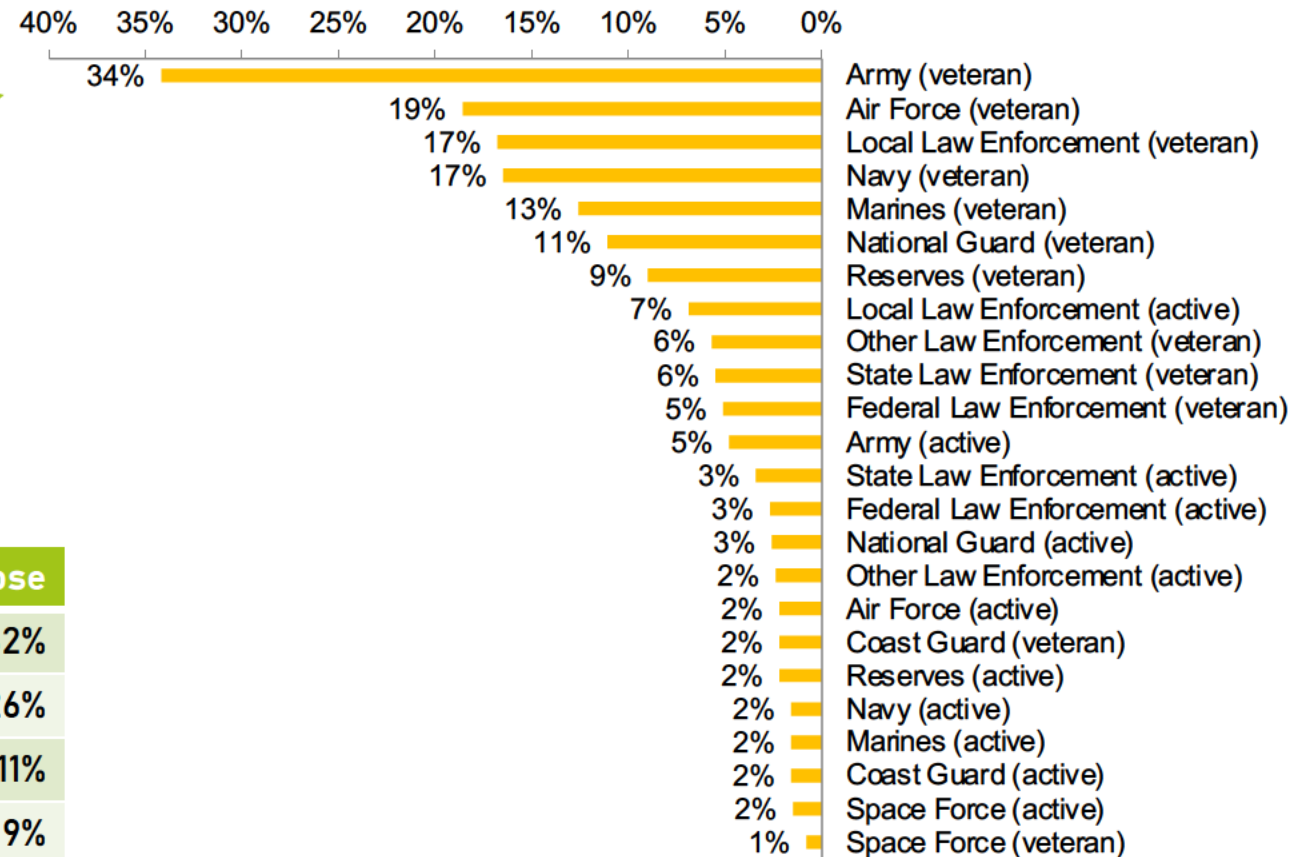
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Respondent Profile: Military/Law-Enforcement

Active or Veteran/Retired Member of Law Enforcement/Military



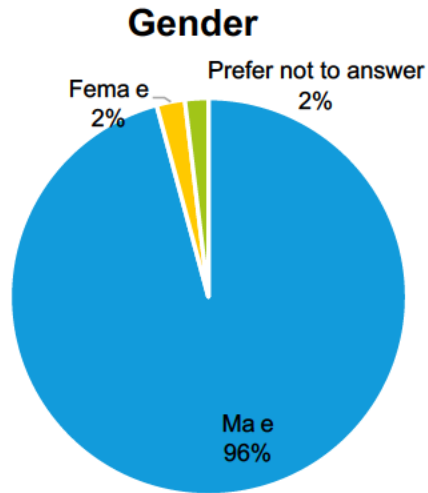
Military/Law Enforcement Affiliation



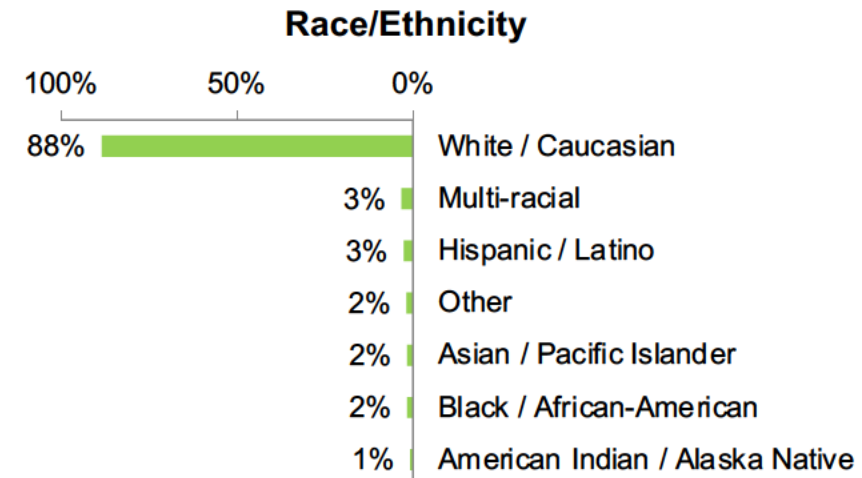
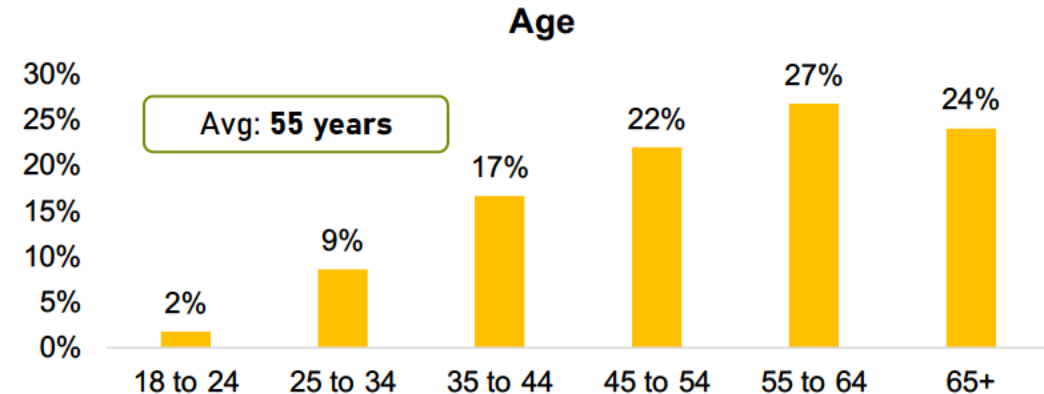
Military/law-enforcement (grouped)	% of those
Veteran military	82%
Veteran law enforcement	26%
Active law enforcement	11%
Active military	9%

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Respondent Profile: Age, Gender

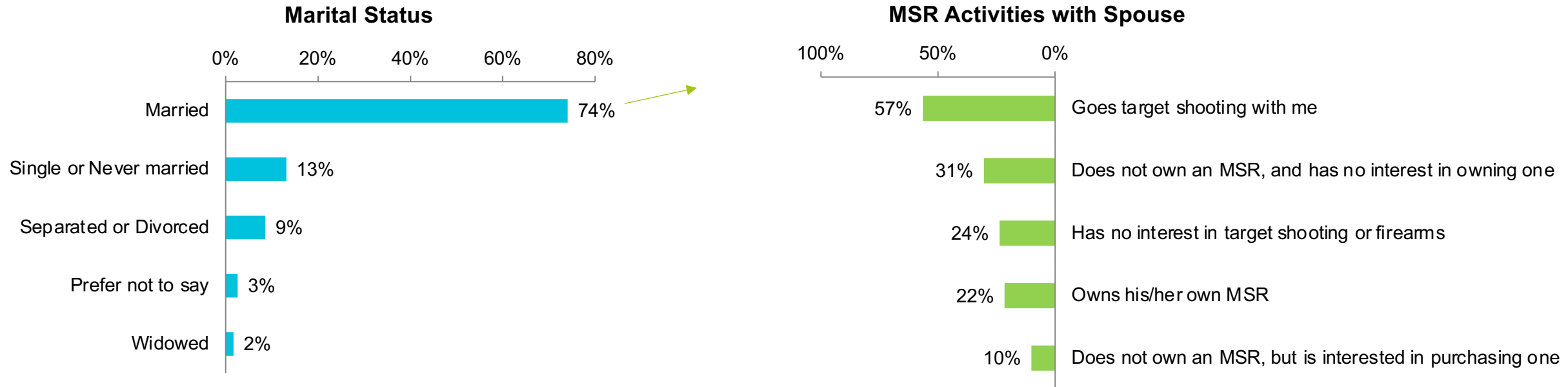


- 96% of respondents are Male.
- The average age of respondents is 55 years old. Only 27% are under the age of 45.
- 88% of respondents are White/Caucasian.



NSSF MSR Consumer Study – Report of Findings

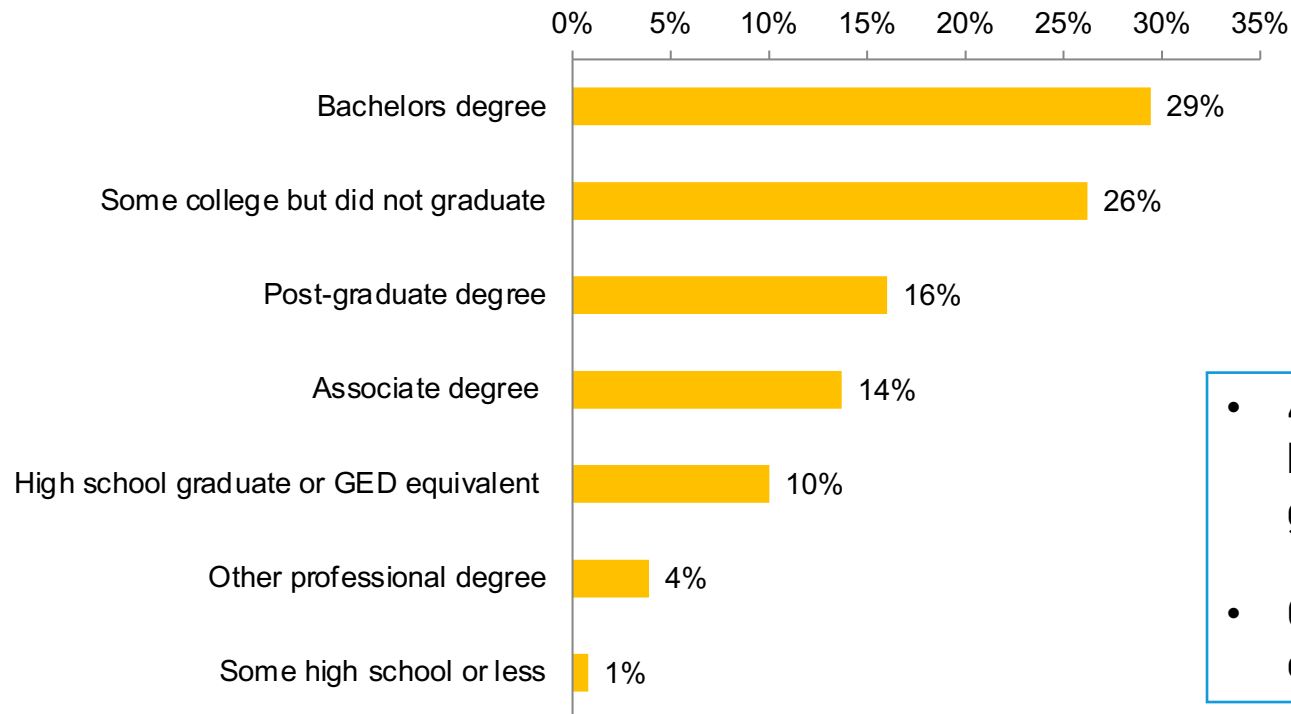
Respondent Profile: Marital Status, Shooting Activities with Spouse



- 74% of respondents are married.
- Of these MSR owners, over half (57%) say their spouse accompanies them for target shooting. Nearly a quarter, 24%, say their spouse has no interest in target shooting or firearms.

Respondent Profile: Education

Highest Level of Education Completed

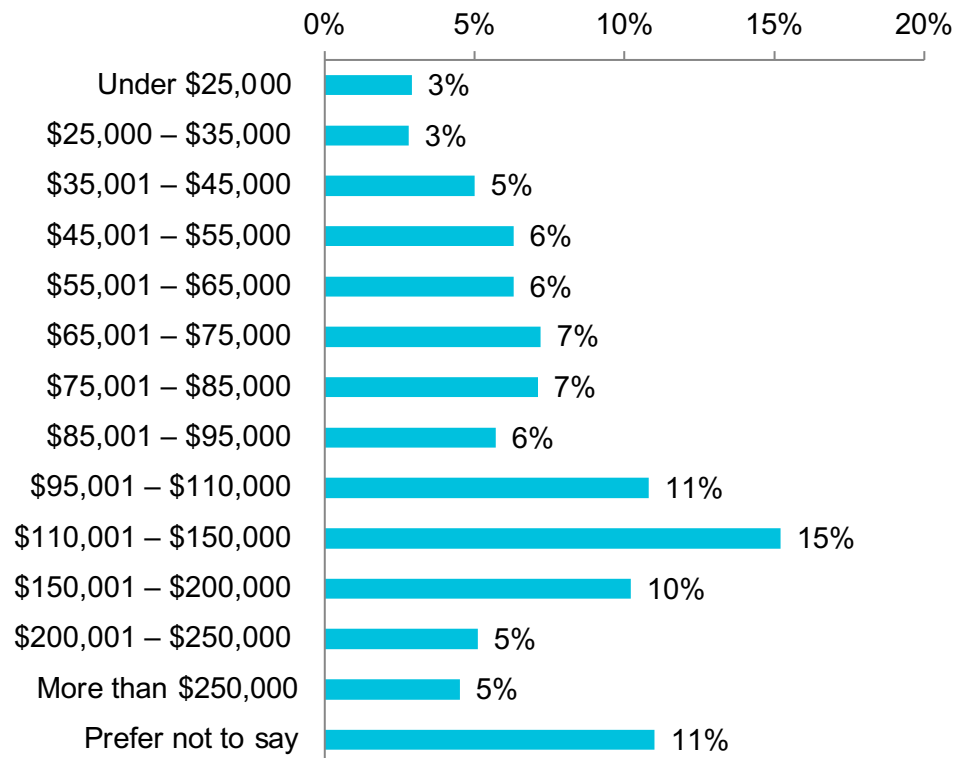


- 45% of respondents have attained at least a bachelors degree (29% have bachelors, 16% post-graduate).
- One-quarter of MSR owners have attended some college but did not graduate.

NSSF MSR Consumer Study – Report of Findings

Respondent Profile: Income

Estimated Yearly Household Income



Avg: \$110,934

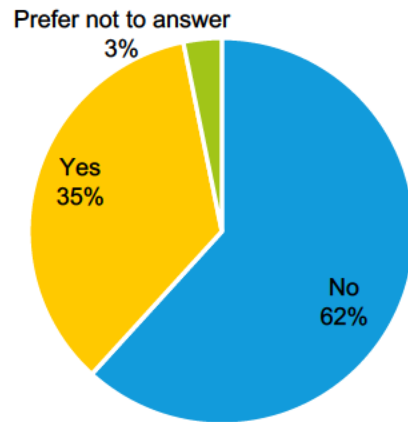
\$85k or less: 37%
More than \$85k: 52%

- The average yearly household income for respondents is \$110,934.
- More than half of MSR owners are in households with an annual income of greater than \$85,000.

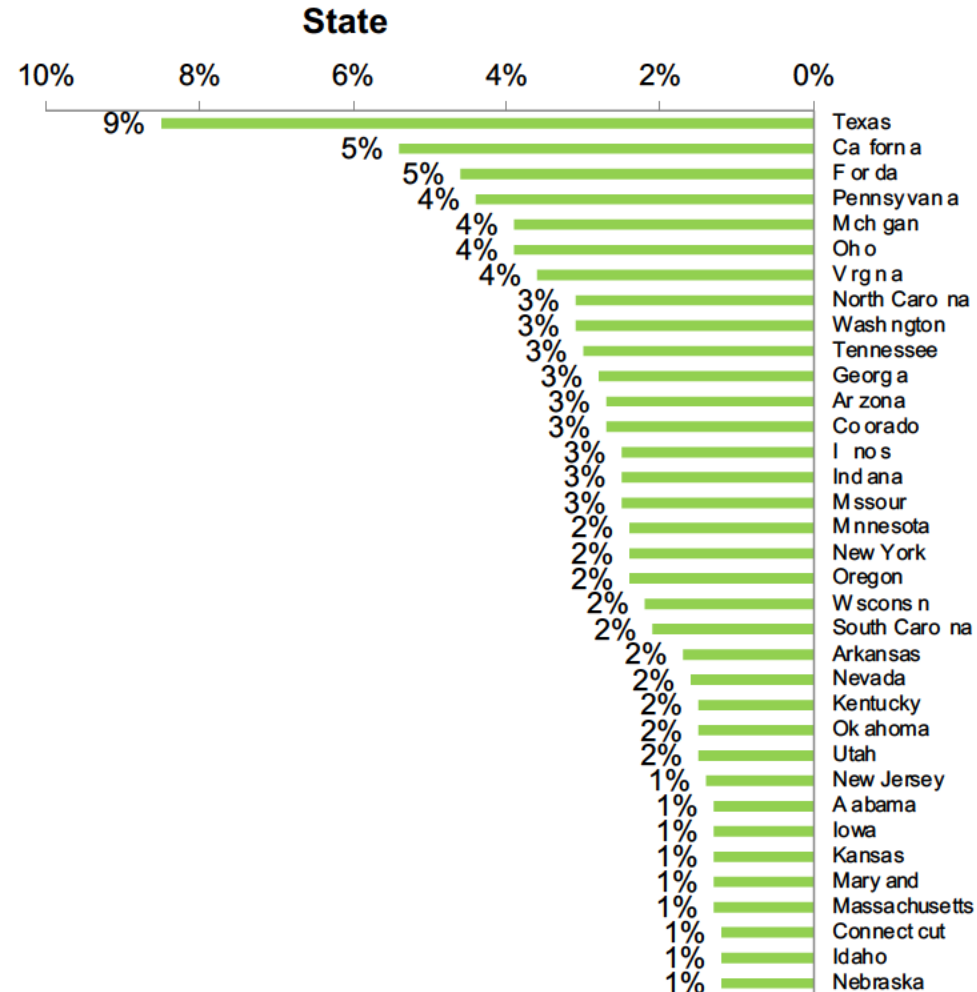
NSSF MSR Consumer Study - Report of Findings

Respondent Profile: State, Household Children

Do you have any children living with you?



- Nearly two-thirds of respondents do not have any children living with them.
- The states with the most respondents are Texas (9%), California (5%), and Florida (5%).



NSSF MSR Consumer Study - Report of Findings

Respondent Profile: State, Household Children

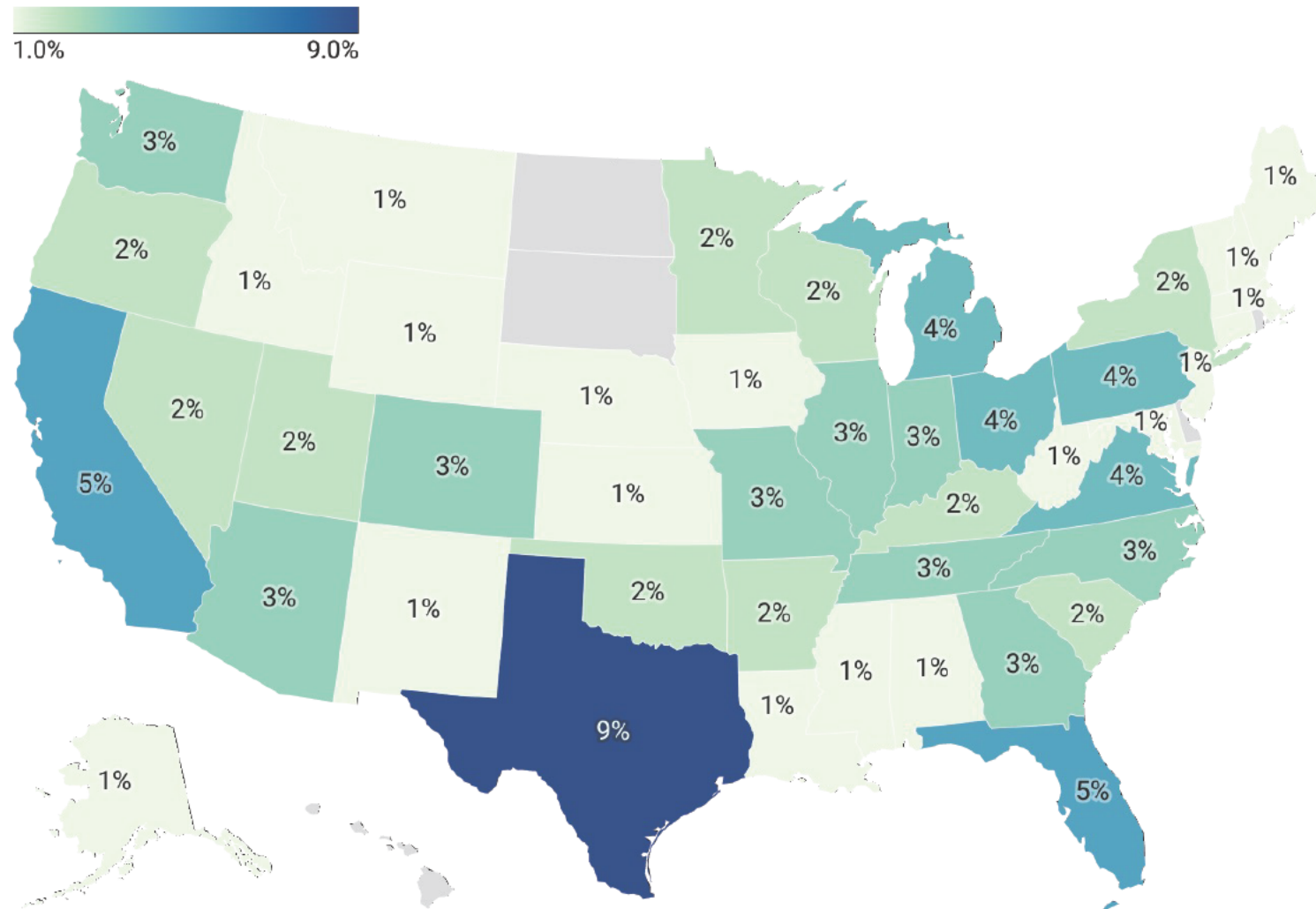




EXHIBIT 18

5 shot and 3 killed after homeowner opens fire on suspects in east Houston

Sunday, January 20, 2019



EMBED <>

MORE VIDEOS ▶

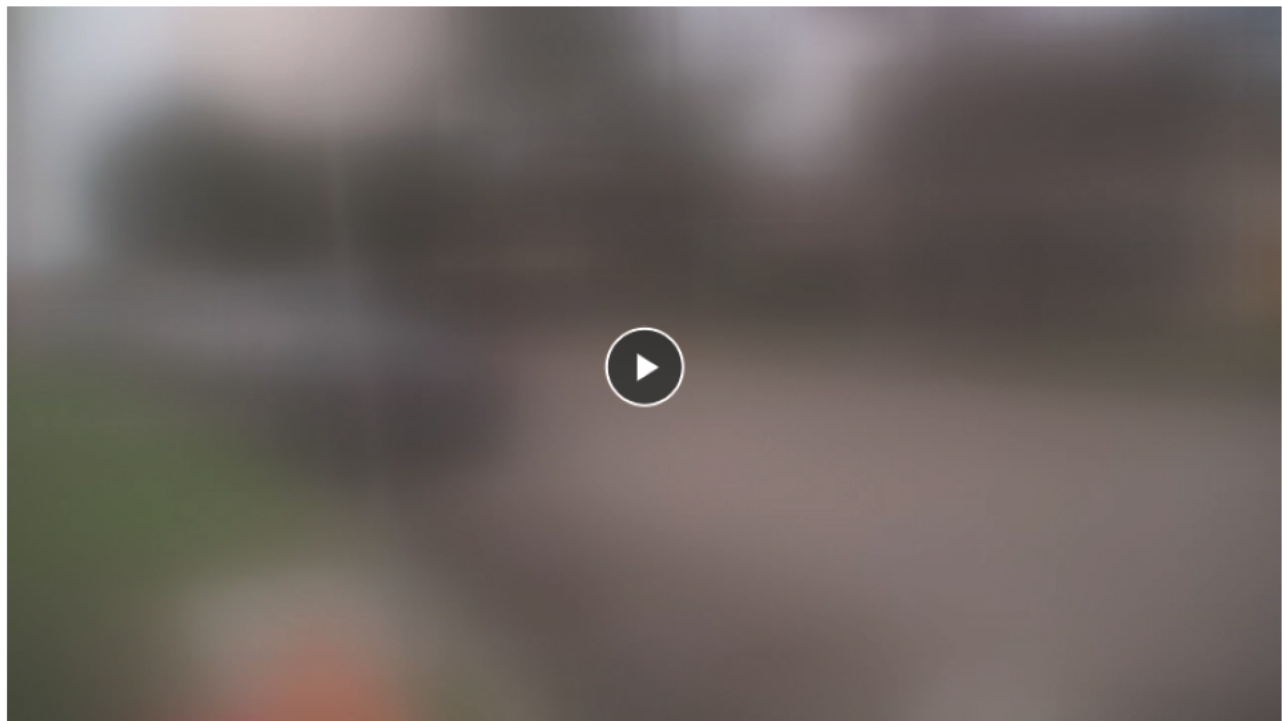
Houston Police are investigating where 5 men were shot by a homeowner with a fully loaded AK-47, killing 3.

HOUSTON, Texas (KTRK) -- Authorities are investigating after dozens of shots were fired in east Houston.

According to a detective, the incident began as a home invasion at the 7000 block of Sherman.

Authorities say the homeowner defended himself when the suspects entered the home. Following the shooting, the suspects fled from the scene.

ABC13 Exclusive interview with witness



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MORE VIDEOS ▶

A witness at the scene says he went outside when he heard the shots to make sure he wasn't dreaming.

Police have set up a perimeter stretching from Harrisburg to Sherman to Capitol, along 71st Street.

At another scene, a vehicle was found about two blocks from the shooting, where a man was found dead in the backseat.

Authorities say that out of five people shot, three of them died.

A witness at the scene says he went outside when he heard the shots to make sure he wasn't dreaming.



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MORE VIDEOS ▶

Authorities say the homeowner defended himself when the suspects entered the home. Following the shooting, the suspects fled from the scene.

In the exclusive interview, the man added he saw two other guys in the front of the home, on the ground.

"I heard around five or six gunshots. I'm pretty sure there were more before that," he said.

At some point, officers with guns drawn were seen searching a port-a-potty.

Follow Stefania Okolie on [Instagram](#) and [Twitter](#).

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EXHIBIT 19

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NEWS

Pregnant Florida mom uses AR-15 to kill home intruder

By **Joe Tacopino**

November 4, 2019 12:05am Updated



Shutterstock

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FLORIDA

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Chris Christie blasts DeSantis over Disney feud: 'Admit when you screwed up'

A pregnant woman is credited with saving the lives of her husband and daughter after she used an AR-15 to **fatally gun down a home intruder**, a report said.

The hero mom sprung into action when two intruders entered the family's Lithia, Fla. home last week and pistol whipped her husband while violently grabbing their daughter, according to the Hillsborough County Sheriff's Office.

"They came in heavily hooded and masked," the husband, Jeremy King, **told Bay News 9**.

"As soon as they had got the back door opened, they had a pistol on me and was grabbing my 11-year-old daughter."

The robbers then pistol-whipped King and kicked him while the man's wife, who is eight months pregnant, retreated into the bedroom.

"When he came toward the back door in her line of sight, she clipped him," King told the outlet. "He made it from my back door to roughly 200 feet out in the front ditch before the AR did its thing."

Police said in a press conference that they found the man's dead body lying in the ditch nearby. The second suspect was on the loose.

The homeowner said he took a "severe beating," but credited his wife for saving him.

"I've got a fractured eye socket, a fractured sinus cavity, a concussion, 20 stitches and three staples in my head," said King.

"Them guys came in with two normal pistols and my AR stopped it. [My wife] evened the playing field and kept them from killing me."

The sheriff's office added that the firearm was in the home legally.

EXHIBIT 20

LOS ANGELES

Santa Monica Owner Protects His Store With Guns Amid Looting



JUNE 1, 2020 / 8:27 AM / KCAL NEWS

SANTA MONICA (CBSLA) – As looters were ransacking stores in Santa Monica Sunday during the George Floyd protests, one man took matters into his own hands.



A Santa Monica, Calif., liquor store owner and his friends defend the store with guns during the looting. May 31, 2020. (CBSLA)

The owner of Broadway Wine & Spirits, located in the 1000 block of roadway, told CBSLA he and some friends decided to stand in front of his store armed with guns.

He said that as looters neared the store, they instead decided to keep walking once they saw his AR-15 and the other guns.

"It was a good thing I had my customers and friends by my side, because it was pretty scary," Joe told CBSLA.

Joe said he and his friends also helped keep other nearby businesses safe as well.

Santa Monica's Third Street Promenade was hit hard by looting and fires Sunday. A Vons grocery store in the 700 block of Broadway was completely ransacked as well. Santa Monica Mayor Kevin McKeown said nine fires were set. There were no serious injuries to officers or protesters.

Santa Monica will again be under curfew orders Monday beginning at 1 p.m. for its business districts and 4 p.m. citywide.

First published on June 1, 2020 / 8:27 AM

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